Values behind biodiversity and moral duties

– Development of a conceptual model for ethical environmental accounting using salmon farming as a case study

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Arne Sveinson Haugen
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The Parts of the Investigation

In order to ease the access to and reading of the present document, the reader should be aware that the document contains the following four parts and attached chapters.

Part I: Investigation structure – *aims and limitations*
Chapter 1 (Introduction – *research area*)
Chapter 2 (Research questions – *values behind biodiversity and moral duties*)
Chapter 3 (Method – *a post-normal science approach*)

Part II: Theoretical basis – *premises and logic*
Chapter 4 (Sustainability Context – *contemporary perceptions*)
Chapter 5 (Conceptual model – *a primary goal*)

Part III: Case study – *salmon farming interests versus environmental interests*
Chapter 6 (Examination and results – *values behind biodiversity*)
Chapter 7 (Discussion and conclusions – *ethical records and practical recommendations*)

Part IV: Epilogue – *so what?*
Chapter 8 (Values behind biodiversity – *general reflections*)

Be also aware that the italicised part of the titles and various subtitles are not shown in the contents¹.

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¹ Chapters, subchapters and sections are structured the following way:
1. Chapter
   1.1 Subchapter
   1.1.1 Section
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**Part I: Investigation structure – aims and limitations**

In addition to Chapter 1 (Introduction – research area), Part I contains a discussion of the research questions in Chapter 2 (Research questions – values behind biodiversity and moral duties) and a description of the method of the present investigation in Chapter 3 (Method – a post-normal science approach).
1. Introduction – research area

Inspired by an international trend aiming at creating a more environmentally friendly and socially responsible business world, the original goal of the present investigation was to develop a system for ethical environmental accounting. The international trend I refer to here is such as the initiatives taken by the World Business Council for Sustainable Development (WBCSD 2007), the Dow Jones Sustainability Indexes (2007) and the Global Compact (2007) to promote sustainable development. This triggered the idea of developing an ethical environmental accounting system for handling environmental controversies in relation to the Norwegian salmon farming industry.

For ethical accounting in general the current status is that systems have to some degree been developed within sectors like banking, agriculture and public administration (Bak 1996, Samseth 1997, Sørensen et al. 1999), and as far as I know also within sectors like medical care, insurance and finance. These systems are, with the exception of those for the agriculture sector, basically built to serve inter-human relations, often inter-human conflict relations where diverging interests are at stake. The aim of ethical accounting is primarily to avoid or solve interest controversies by reducing or eliminating negative impacts that the activities and agendas of one party might have on the interests of others.

A core challenge when doing such accounting, whether it is about humans only or it includes nonhumans, is to decide who should be regarded as stakeholders (Samseth 1997 p.9, Sørensen et al. 1999 p.11-15). This means to decide what parties to care about when making ethical assessments. For ethical accounting in the field of the environment I therefore found it necessary when designing the present investigation to address the question of possible stakeholder status of ecological entities. This means whether and to what extent animals, plants, species, communities and ecosystems might be regarded as stakeholders. I have decided for the present investigation to use the term moral stakeholder to describe stakeholders that are perceived to have a moral standing or status that makes them worthy as parties to care about when making ethical assessments about values at stake. This represents a non-instrumental valuation of ecological entities as ends in themselves. Linked to this is the question of whether such a non-instrumental valuation might be graded.
Another core challenge in ethical accounting is to find practical values that can be measured, counted or at least characterised (Bak 1996 p.18-19, Samseth 1997 p.9, Sørensen et al. 1999 p.15, 18, 76). These should be values reflecting the interests of the stakeholders affected by some activities or agendas. For ethical environmental accounting specifically this means, as I see it, to identify which environmental values are at stake among the affected moral stakeholders. In the context of the present investigation, this is about valuations of ecological entities such as nonhuman organisms, species, communities and ecosystems.

The valuations of ecological entities might be instrumental or non-instrumental. Non-instrumental valuations are, as mentioned, when ecological entities are perceived to have a worth as ends in themselves. Instrumental valuations refer to situations where ecological entities are valued as means to other ends. Examples of such valuations are economic values, food values, aesthetic values or recreational values. Also moral stakeholders may have instrumental value in addition to their worth as ends in themselves. In short I will refer to the variety of valuations of ecological entities, whether instrumental or non-instrumental, by the term “values behind biodiversity” used in the title of the present investigation. This means that the specific question of moral stakeholder status actually represents one value type within the range of values behind biodiversity. In general, therefore, when I refer to values behind biodiversity alone, I consider this also to include the issue of moral stakeholder status.

When the questions of moral stakeholder status and values behind biodiversity are answered, a third core challenge in ethical accounting is to set ethical goals for the accounting. This means that the party doing the accounting should set goals for how to avoid that their activities and agendas have negative impacts on moral stakeholders. These are goals based on moral duties in relation to the values behind biodiversity at stake. The goals might either be to maintain the status quo with regard to some kind of good or strong ethical records in relation to the values at stake, or if the ethical records are weak, to work for better or stronger records.

I use the term “ethical record” in relation to judgements of whether activities and agendas are good or bad. Activities and agendas that are good result in a judgement of a strong ethical record, while those that are not so good, or rather bad, will result in a weak ethical record. This is further explained in Chapter 3 (Method – a post-normal science approach).
Answers to the questions about moral stakeholder status, values behind biodiversity and moral duties constitute, as I see it, a necessary value ground that needs to be settled before ethical environmental accounting systems can be developed. I therefore decided to leave the original goal of developing a system for ethical environmental accounting tailored for the Norwegian salmon farming industry and instead search for possible value grounds.

I use the term “value ground” to refer to ethical positions emerging from the answers to the questions about moral stakeholder status, values behind biodiversity and moral duties. Three such ethical positions that might constitute value grounds for ethical environmental accounting are described and discussed in Chapter 5 (Conceptual model – a primary goal).

With this focus on ethical positions I will not move into the field of regulatory arrangements, whether this should concern national law and regulations or international agreements. That would be too wide a scope to be handled within the frames of the present investigation.

1.1 Ethical environmental accounting – search for possible value grounds

In the search for possible value grounds for ethical environmental accounting I have decided to focus on analyses of how philosophical theories of environmental ethics might be used in practice to sort out perceptions about moral stakeholder status, values behind biodiversity and moral duties in relation to the value perceptions. Zimmerman (1998 p.3) says that such philosophical theories represent efforts to examine critically the notion that nature has inherent worth and efforts to inquire into the possibility that humans have moral duties to animals, plants and ecosystems. This means to sort out the extent to which ecological entities such as nonhuman organisms, species, communities and ecosystems might have instrumental or non-instrumental value. The moral duties will stem from the extent of non-instrumental valuations and the kinds of instrumental valuations of ecological entities.

Having then decided to search for possible value grounds for ethical environmental accounting I consider it natural that the main research questions of the present investigation should be about moral stakeholder status, values behind biodiversity and moral duties. As mentioned above, I generally perceive the specific question of moral stakeholder status to
represent one value type within the range of values behind biodiversity. However, when handling the three research questions, I exclude the moral stakeholder issues from the notion of values behind biodiversity, since this is then handled separately.

The discussion of moral duties in relation to values behind biodiversity will be held in the context of sustainability. One reason for this is that sustainability is a frequently used term in discussions of biological conservation, environmental ethics and economic development (Lemons and Brown 1995, Perman et al. 1999, Lee et al. 2000). Another reason is that the concept of sustainability is accepted by many international leaders and influential organisations throughout the world as a way of reconciling potential conflicts between environmental protection and human development goals (Brown and Lemons 1995 p.1, 4-5, WSSD 2002).

A primary goal of the present investigation is the development and demonstration of a conceptual model for identifying values behind biodiversity. This model is meant as a tool for sorting out how ecological entities might be valued, and how that creates a basis for assessments of moral duties in relation to the sustainability of such values. The term “conceptual” is used to express that the model should be seen as a kind of framework or structure for how such models can be developed and constructed. This is done so because it is practically impossible within the limits of the present investigation to cover all different kinds of philosophical theories about environmental ethics that might have relevance for questions related to values behind biodiversity. The conceptual model should therefore be seen as a suggestion of how such theories might be handled more than as a completely developed tool kit.

It is important to be aware that the investigation is a practical approach to philosophical theories about environmental ethics. This means that the interpretations of such theories are seen from the perspective of my background as a biologist and my 20 years of work experience within the Norwegian fish farming industry, mostly with salmon. Many professional philosophers may have objections to my practical interpretations of the philosophical theories. Despite this, however, I hope that the practical view taken will contribute with some fruitful examples of challenges that philosophical theories about environmental ethics might be faced with when applied to practical questions. I assume in this connection that one of the intentions of such philosophical theories is to search for
clarifications of or guidance to the complexity of everyday moral decisions, controversies and acts. The ethical elaborations in the present investigation should therefore not be read as deep and thorough discussions as such of philosophical theories about environmental ethics. The elaborations are rather meant to demonstrate how the philosophical theories might be interpreted and applied in real-life situations.

Due to my 20 years of work experience within the salmon farming industry, I am aware that I might be accused of being biased so that my judgements will be too mild or positive in favour of the salmon farming industry. On the other hand, there is also the risk that my judgements might be too strict, just because of the fear of being biased. Since this is especially crucial for my judgements of ethical records in the case study, I will explain all the steps in my argumentation as carefully as possible. It should also be added to this that my subjective judgements should be seen as an input for further debate and development, rather than as firm and settled conclusions from my side. The intention of the case study is to describe the judgement process and also to demonstrate possible outcomes from it.

In this connection it is tempting to refer to Bryan G. Norton (2003 p.8) when he talks about the importance of addressing philosophical problems within the context of concrete environmental problems. He says that a common insight useful to recognise is that our current academic and intellectual practice of forming disciplines and developing distinct paradigms makes sense only if these disciplines are understood as useful and temporary outposts at the frontiers of knowledge and ignorance. Norton explains that if this knowledge should be used to justify and explain management policy it must eventually be integrated in a more inclusive transdisciplinary language. This is, he says, a language from the perspective of a wise manager, and not from the perspective of any disciplinary specialist. This is what the present research is aiming at by its small, but hopefully useful contribution.

To have a mode for achieving this, I have decided to build the investigation on the post-normal science approach and the ideas of participatory processes. Post-normal science is an emerging type of science which is developed in response to the challenge of handling complex policy issues such as in the fields of risk and the environment (Funtowicz and Ravetz 1993 p.739, 754). The present investigation is in this context limited to ethical questions in the field of the environment, leaving out questions about risk.
Post-normal science is characterised by the requirements of extended peer communities in the quality assurance of scientific inputs to policy processes. The method can be characterised as participatory since it according to Funtowicz and Ravetz (ibid. p.752) involves the inclusion of an ever-growing set of legitimate participants. For such participatory methods or processes the basic idea is to involve stakeholders and laypeople in ethical assessments and judgements of value questions (Forsberg and Kaiser 2000 p.3-5). This is often termed as bottom-up oriented processes, conducted by such as consensus conferences and citizen panels.

One important topic in this connection, which will be discussed in Part II (Theoretical basis – premises and logic), is the value-laden dimensions of scientific methods and tools. Part of this is that difficult ethical questions are often inextricably embedded in scientific reasoning, which is due to the technical and practical need to make untested value-laden assumptions and inferences. This means that scientific statements often contain hidden ethical positions because of uncertainty, burden of proof, decisions about which resources to use, choice of disciplines and metaphysical assumptions about the nature of reality. It is therefore emphasised that in relation to decision making it is important that the value-laden dimensions of scientific and technical studies are disclosed.

It should be noted that though the practical approach of the present investigation is linked to the Norwegian salmon farming industry, the results will hopefully be of relevance also for other industries. This applies especially to aquaculture activities and agendas in general. The results might, however, also to some degree be relevant for fishermen, for farmers in agriculture, for other professional activities and businesses and in situations where human activities in general impact on animals, plants and ecosystems. This is because the theoretical discussions and elaborations of moral stakeholder status, values behind diversity and moral duties basically are about ecological entities in general.

It might in this connection be relevant to mention that though the present investigation focuses on the Norwegian salmon farming industry, the questions that are addressed are linked to international issues and agendas. This is both in relation to an international research agenda and in relation to international agreements, which both are too extensive to be handled within the frames of the present investigations. The only exception is ethical issues directly linking the Norwegian salmon farming industry to the international scene.
1.2 Structure – *theoretical basis, case study and an epilogue*

To handle the research questions the present investigation consists of four parts. Parts I, II and III are shown in mind photo 1.1. Part IV, which is titled “Epilogue – *so what*?”, contains some general reflections about values behind biodiversity.

I have chosen to use what I call mind photos when trying to visualise my thoughts and perceptions. These might be understood as kind of mind charts or sketches showing the logic and contents of my ideas. The term “mind photo” is chosen instead of more common and usual terms such as “figure”, “table” and “box”. The main reason for this is to signal that the mind photos represent simplified sketches, which should be understood on the background of modifications and elaborations in the text, more than plain presentations of results. Though the mind photos are especially relevant for the development of the conceptual model, I have chosen to use them throughout the whole investigation.

**Mind photo 1.1** Investigation parts – *Part I, Part II and Part III*

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**Part I**
- Investigation structure
  - aims and limitations
- Chapter 1: Introduction
  - research area
- Chapter 2: Research questions
  - values behind biodiversity and moral duties
- Chapter 3: Method
  - *a post-normal science approach*

**Part II**
- Theoretical basis
  - premises and logic
- Chapter 4: Sustainability Context
  - contemporary perceptions
- Chapter 5: Conceptual model
  - a primary goal

**Part III**
- Case study
  - *salmon farming interests versus environmental interests*
- Chapter 6: Examination and results
  - values behind biodiversity
- Chapter 7: Discussion and conclusions
  - ethical records and practical recommendations

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Part I is titled “Investigation structure – aims and limitations”. In addition to the current introduction, this part contains a discussion of the research questions in Chapter 2 (Research questions – values behind biodiversity and moral duties) and a description of the method of the present investigation in Chapter 3 (Method – a post-normal science approach).

Already at this stage it should be mentioned that one part of the conceptual model, which I term the “flourishing matrix”, is fully described in this third chapter. Flourishing matrixes are used to help identify and characterise the kinds of values behind biodiversity that might be of interest for moral stakeholders. As is often the case in environmental literature, the term “flourishing” refers to an individual’s ultimate life expectancy or as an expression related to the fulfilment of life potentials on Earth. The term “matrix” refers to the way this term is used such as in coin production, where it represents the ideal form or master die of a coin. This means that flourishing matrixes should be understood as ideal representations of possible life fulfilment potentials.

Part II is titled “Theoretical basis – premises and logic”. It begins with a review in Chapter 4 (Sustainability Context – contemporary perceptions) of discussions about sustainability. The reason for allocating a full chapter for this review is that the sustainability term, as mentioned, is a widely accepted and frequently used term in discussions of biological conservation, environmental ethics and economic development.

The main purpose of Chapter 4 (Sustainability Context – contemporary perceptions) is to review and reveal contemporary perceptions about sustainability and to show how such perceptions support the way the sustainability term is applied in the present investigation. In this connection I describe a sustainability context in Chapter 3 (Method – a post-normal science approach) intended to bolster the development of the conceptual model and frame the discussions in the case study of Part III. This context I term the “Sustainability Context”. The aim of the review in Chapter 4 (Sustainability Context – contemporary perceptions) is to show how the Sustainability Context connects and correlates with contemporary perceptions about sustainability.

The Sustainability Context constitutes then together with Part I a contextual ground or framework for the development of the conceptual model in Chapter 5 (Conceptual model – a
As mentioned, I denote this as a primary goal because the conceptual model is meant as a tool to help identify possible value grounds for ethical environmental accounting. It is also a primary goal in the sense that the development of the conceptual model gives important input to the research questions on a theoretical basis.

Part III is titled “Case study – salmon farming interests versus environmental interests”. This contains a case study of some controversies between the Norwegian salmon farming industry and environmental interests. The intention is to test how the conceptual model might work in practice. The case study builds, as shown in mind photo 1.1, both on Part I (Investigation structure – aims and limitations) and on Part II (Theoretical basis – premises and logic).

The Norwegian salmon farming industry is in the case study accused of threatening values behind biodiversity of interest for other moral stakeholders. The case study is arranged as a kind of hearing process with a charge, an examination, judgements of ethical records, verdicts and some ethical goals. The form of the case study might be characterised as semi-narrative. This is because the hearing process of the case study is a kind of fiction with a charge against the Norwegian salmon farming industry as a basis for the examination, the judgement process, the verdicts and the ethical goals. At the same time, however, it is not like some free and entertaining fiction. The form is stricter, with specific questions and with answers containing facts and values referred to in cited publications and reports. On the other hand, it is not as strict and systematic as is the expected norm when presenting empirical data. In short, it could be said that the form of the narrative is akin to fiction, while the content is strictly empirical. The aim is that this semi-narrative form of the case study will simulate and demonstrate how a real-life participatory process might be performed and what kinds of results might come out of it.

Chapter 6 (Examination and results – values behind biodiversity) contains the examination of the parties in the controversies about the accusations in the charge. This is followed by judgements in Chapter 7 (Discussion and conclusions – ethical records and practical recommendations) of ethical records and verdicts according to the charge. Included here are also suggestions about ethical goals and possible measures for keeping account of progress and achievements in relation to these goals. At the end I make some practical recommendations regarding certain prioritised issues I believe are important for the Norwegian salmon farming industry to focus on when developing systems for ethical
environmental accounting. I consider these practical recommendations to represent the most interesting part in the conclusions of the present investigation when viewed from the perspective and specific interests of the Norwegian salmon farming industry.

The final part, Part IV “Epilogue – so what?”, contains Chapter 8 (Values behind biodiversity – general reflections). Here I give, as mentioned, some final reflections about values behind biodiversity. These reflections might be seen as a general synopsis of the present investigation. Three questions are discussed. They are about cultural landscapes versus farming salmon, wild salmon versus the minnow species\(^2\), and animal welfare versus salmon game fishing.

The reader should be aware that the reference list of the present investigation is split into two parts. The second part, “References II – references used exclusively for the examination”, contains the references that are used exclusively in Chapter 6 (Examination and results – values behind biodiversity), while the first part, “References I – except references used exclusively for the examination”, are references used in the other chapters. Those references that are used both in Chapter 6 (Examination and results – values behind biodiversity) and in the other chapters are listed in the first part only.

1.3 Conceptual model – why conceptual, value pluralism, buzzwords

Since the conceptual model represents a primary goal of the present investigation, the following three reflections are given as an introductory and brief idea of what the conceptual model is about.

**First reflection – why conceptual?**

The first reflection is about the intention to try to develop a conceptual model for the search for values behind biodiversity and assessments of moral duties. Though the intention or

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\(^2\) The minnow is a small carp fish living in fresh water lakes and watercourses, and was previously endemic to some parts of Eastern Norway and the Northern counties of Troms and Finnmark. The minnow has during the last hundred years been spread to most parts of Norway and is now a strong competitor to many local fresh water fish stocks. (NINA 2007)
ambition is limited to developing a conceptual model, such a model needs to be relatively comprehensive and cover the most prevailing traditional and contemporary philosophical theories. But at the same time it should be practically manageable for handling and assessing moral duties.

Since it is impossible within the limits of the present investigation to cover all different kinds of philosophical theories about environmental ethics, a selection is necessary. It is therefore unavoidable that this selection will be influenced and restricted by the views, positions and knowledge base of the developer, in this case me. This is why the model is seen as a suggestion or a concept for how such theories might be handled more than as a completely developed tool kit.

Second reflection – value pluralism

The next reflection is linked to the post-normal science approach and participatory processes. The reflection is about a condition which in ethical philosophy is referred to as the pluralism of values in societies, specifically in liberal, democratic societies (Forsberg 2007 p.63). I interpret this pluralism in a descriptive and pragmatic sense to mean that it is unrealistic in a practical real-life situation to believe that all parties involved in environmental controversies might agree on one specific value ground for ethical assessments. Since this refers to a descriptive and pragmatic interpretation of pluralism in relation to value perceptions only, I do not take any stand to what role pluralism might play as a ground or basis for ethical theories or positions as such.

My aim is that the conceptual model could, by the search for values behind biodiversity and moral duties related to such values, at least help create a mutual understanding between moral stakeholders, primarily in regard to the differences they might have in their valuations of ecological entities. This means that the environmental ethical value grounds of the parties could to some extent be identified and described so that the parties gain some insight into the rationale behind the arguments of the others. The primary goal, therefore, is a model that can help create such a mutual understanding without necessarily reaching an agreement about these valuations. The best-case scenario, however, would be if this could also result in common understandings and agreements on value grounds for solving environmental controversies and also for establishing ethical environmental accounting systems.
Third reflection – buzzwords

The third reflection is about a need to find ways for how to handle the mixture of facts and values often encountered in biological science, and in conservation biology specifically. This is addressed by writers such as Weiner (1992), Robertson and Hull (2003) and Odenbaugh (2003). The facts and values issue links to the relevance of the research questions about moral stakeholder status and values behind biodiversity.

One general impression from the discourse in the field of the environment is that when terms such as sustainability, biodiversity, next generation, dignity, integrity, value in itself, intrinsic value, inherent value, worth, natural, welfare and aesthetic are used in support of environmental protection, they are not always clearly and distinctly defined (Lemons and Brown 1995, Wetlesen 1996). It is therefore a risk that this can lead to some confusion with regard to how ecological entities are in actual fact valued. I suspect that in some cases the above terms are used as a kind of value-laden buzzwords that give extra strength to conservation interest. This might be because these buzzwords are perceived as more sublime or elevated than other more prosaic and often economy-related value terms such as utility, resource, assets, capital and revenue. The risk is therefore that a mixing of biological facts and values by the use of buzzwords might be detrimental to an upright and honest debate or discourse in the field of the environment.

One example to illustrate the use of buzzwords is when the term “value of their own” is used in the Norwegian Parliamentary Report (2005 p.3) regarding animal husbandry and animal welfare. I perceive this term as a buzzword because it is used as a reason for why the handling of animals shall be carried out with care and respect, without explaining or defining what value of their own is about. The term “value of their own” might sound like it has the sublime or elevated meaning of ends in themselves. But as long as the Parliamentary Report is about husbandry of domesticated animals, the main motivation for keeping such animals is their utility values. This makes it difficult to see that the sublime understanding of value of their own really holds, and that this understanding probably has to yield to the more economy-related valuations of the animals.

Another example is when wild salmon protection interests, as referred to in Chapter 6 (Examination and results – values behind biodiversity), argue for the protection of wild salmon. It is the use of the term “biodiversity” I perceive as a buzzword in this connection.
This is such as when the importance of conserving biodiversity is referred to without qualifying why biodiversity is important. Similarly, when it is emphasised that the protection of wild salmon can be regarded as a touchstone of Norway’s ability and will to protect biodiversity, it is again not qualified why biodiversity is important. The reference made to the United Nations Convention on Biological Diversity does not help much, I think. I am rather apt to believe that the real rationales or agendas behind the efforts to protect wild salmon are more related to such as the recreational and the economic utility values of wild salmon as a game fish. The reference to biodiversity is made, I suspect, without really putting wild salmon protection into the broader perspective and saying why biodiversity in general is so important. Because, if biodiversity as such is the core thing, why then are minnow combated by all means (Taugbøl et al. 2002 p.4-5)?

It might well be, however, that my interpretation above of the wild salmon protection interests will be objected. If so, then the reasons are even stronger for why the research questions are addressed and the conceptual model is developed in an effort to reveal what might be the values referred to when using the term “biodiversity” or other kinds of buzzwords.

This focus on value-laden buzzwords has some similarities with Williams’ (1985 p.129, 140) reference to thick concepts. He mentions treachery, brutality, courage, cowardice, lying and gratitude as examples of thick concepts. What characterises the thick concepts, he says, is that they seem to express a union of fact and value. They are in other words both descriptive and normative. Thick concepts are located somewhere in between a purely descriptive concept, such as being a stone, and a purely normative thin concept, such as being good (Baune 2007). Biodiversity might in this sense be regarded as a thick concept if it besides the reference to the variety of ecological entities is also perceived to represent something good.

My intention by addressing the indistinctness or ambiguity that might adhere to the use of buzzwords is not that these words should necessarily be avoided. It is more because I believe it would be clarifying to know specifically what qualifications are associated with the normative part of the value-laden buzzwords.
1.4 Prosperity of salmon farming – prototype of tomorrow's industries?

Finally, before moving to the next chapter where the research questions are presented, I will say some words about the Norwegian salmon farming industry and its market environments. I have been working in this field for 20 years, and it was therefore natural to link the present investigation to this industry. Just as important for this choice is that salmon farming is a relatively new and fast growing industry with a number of compelling challenges and opportunities. The history of the industry is relatively short, with a remarkable growth over the last 30 years. The annual production of Atlantic salmon (Salmo salar) in Norway was less than 10,000 tonnes in the pioneer period of the 1970s. This has increased steadily to an annual production of 597,000 tonnes in 2006 (EFF 2006 p.11, FHL 2005a p.3). Scenarios made for 2020 predict that the growth in the salmon production in Norway will most probably continue and that there are potentials for a two- to threefold increase (ECON 2002 p.55, 75, 89).

Challenges related to this growth are the negative impacts on environments and societies of the kinds addressed in Chapter 6 (Examination and results – values behind biodiversity). These are negative impacts such as degradation of the environment, depletion of natural resources, threats to the world’s food supply, unacceptable area use, reduced animal welfare and diminishing food safety. The opportunities related to the growth lie in the creation of work and income. In 2005 the export revenue of salmon farming was about 13.5 billion NOK, which contributed to 5.2 % of Norway’s mainland export revenue that year, when oil and gas are excluded (FHL 2005a p.4, SSB 2006). The fish farming industry of Norway, of which salmon farming represents about 90 %, employed directly approximately 2,600 man-years in 2004. The total number of man-years which directly and indirectly depend on fish farming is estimated to 19,500 (SINTEF 2005 p.18-19). More details about these challenges and opportunities are given in the case study.

Two aspects from the broader perspective of the global market environment should be mentioned. The first is that the perspectives for the future indicate a steady growth in aquaculture production globally. As the worldwide catches of wild fish seem to level off at about 100 million tonnes per year, aquaculture is estimated to increase from a production in 2004 of 46 million tonnes to about 80 million tonnes in 2030. This means almost a doubling of the total production of aquaculture globally (FAO 2006 p.151).
The other aspect is that the long-term challenges related to the environment and the interests of societies in recent years have increased significantly within industries and among the consumers. For the food producing industries this has been triggered by incidents like the food safety crises linked to dioxins, bovine spongiform encephalopathy\(^3\), mouth-and-claw disease, bird flu, controversies about genetically modified organisms (hereafter: GMO) and animal welfare issues. Media and pressure groups have, as I have experienced it, to a great extent driven the focus on all these incidents. Other triggers are the different international initiatives taken to support and encourage processes towards more environmentally friendly and socially responsible business and trade. These are such as the abovementioned initiatives of the World Business Council for Sustainable Development, the Dow Jones Sustainability Indexes and Global Compact.

Some may say that it is unrealistic to believe that the salmon farming industry, or for that matter any industry, will seriously be able to follow the responsible route by being fully concerned with the environmental challenges and long-term interests of societies. Such a pessimistic outlook was given by two keynote speakers at the AquaVision conference in 2004, Ray Cesca, president of the Illinois-based consulting firm GAEA International and Barry Costa-Pierce, Professor of Fisheries and Aquaculture at the University of Rhode Island. They (AquaVision 2004) address the lack of a global strategy in the aquaculture industry, namely that business models in aquaculture are often totally outdated, and that new business models and community roots are necessary to sustain “the blue revolution”. Since the Norwegian salmon farming industry is relatively new, however, I believe that it should have good possibilities for innovative thinking without being too tied to old and rigid habits, and therefore be able to think proactively. Further, the trend within the industry of ever increasing consolidation towards a global structure with relatively few big players should enforce the ability to embed changes and adjustments throughout the whole industry. Therefore, if it chooses to follow the responsible route and try to bring the long-term perspectives into their activities and agendas, I believe that the Norwegian salmon farming industry might, if it wants, develop into a prototype of tomorrow’s environmentally and socially responsible industry. This is at least what has motivated me to do the present investigation.

\(^3\) BSE, commonly known as “Mad Cow Disease”
2. Research questions – moral stakeholder status, values behind biodiversity and moral duties

The research questions should be seen in the context of the original goal of the present investigation. This was, it should be recalled, to develop an ethical environmental accounting system for handling environmental controversies in relation to the Norwegian salmon farming industry. However, as I say in Chapter 1 (Introduction – research area), before a system for ethical environmental accounting tailored for the Norwegian salmon farming industry might be developed it is necessary to search for possible value grounds for such accounting. This means to find ways of answering the questions of moral stakeholder status, values behind biodiversity and moral duties. These three questions represent therefore the main research questions of the present investigation.

2.1 Values behind biodiversity – what is it?

Before presenting the three research questions in full, two kinds of background information will be given. The first concerns some interesting responses related to the question of values behind biodiversity. The other is a description of how values behind biodiversity should be understood in the present investigation.

2.1.1 Intrinsic values behind biodiversity? – “I don’t know”

Among environmental philosophers there are many who are critical to the claim that species and ecosystems have intrinsic value (Odenbaugh 2003 p.62-63). Moreover, Odenbaugh says, even philosophers who agree that biodiversity has intrinsic value do not agree as to why it has such a value. When Takacs (1996 p.147-149) asked biologists about this, he found that the majority of the conservation biologists he interviewed believed that species have intrinsic value. But when asked why species may or may not have intrinsic value, they were reluctant to offer arguments for this. The following is a sample of the kinds of answers Takacs received in his interview:

David Ehrenfeldt: ‘For biological diversity, value is. Nothing more and nothing less. […] Well, I couldn’t prove it, I guess. I just believe it.’
Paul Erlich: ‘I just can’t have the feeling that the only value [species] might have is what they might mean to us. But you can’t possibly defend that scientifically.’

Jerry Franklin: ’Oh, I basically think so, yes. But I haven’t given a whole lot of thought to it.’

Daniel Janzen: ‘The word value is anthropocentric…. That’s a contradiction in terms.’

S.J. MacNaughton: ‘I don’t see how anything can have value outside of a value that humans beings place on it, because value is really something uniquely human, isn’t it?’

David Pimmentel: ‘[I]n trying to protect or conserve nature, to use the argument of intrinsic value gets you – well, I don’t think it sells very well.’ (Takacs 1996 p.249-252)

Though I understand and have sympathy for the difficulty in answering why species may or may not have intrinsic value, I wish to contribute to this by a more systematic and analytic approach. This is what I am trying to do in my way of answering the research questions of the present investigation. While still realising that clear and unambiguous answers will not necessarily be available, I am searching for ways of handling this by use of rational and logical argumentations.

2.1.2 Values behind biodiversity – natural and cultural entities

Since “values behind biodiversity” is a basic term in the present investigation, I find it necessary to explain the term more precisely than has been done so far. Initially I said that the term refers to different kinds of valuations of the variety of ecological entities in nature. As examples of ecological entities in nature I mentioned nonhuman living organisms, species, communities and ecosystems. These ecological entities might together with other natural entities, such as rivers, mountains and spectacular sceneries, be associated with the more general term environment. In other situations, however, the term environment could also include cultural entities such as works of art, monuments, galleries, architecture, parks and infrastructure as we experience it in modern cities, or the man-made cultural landscapes and traditional villages of the countryside.

It is sometimes difficult to distinguish clearly between what might be a natural and what might be a cultural entity. Linked to this Westra (1994 p.21-22), as is referred to in Chapter 4 (Sustainability Context – contemporary perceptions), says that the wholeness of ecosystem
integrity represents both a natural and a cultural part, which are not always clearly separated. Examples of such borderline cases which typically are both natural and cultural are cultural landscapes, parks, agricultural plants, domesticated animals and things like ornamental fishes and plants. What I see as paradigmatic examples of natural entities are such as wild animals and plants, and pristine ecosystems. On the other hand I regard works of art like paintings and sculptures, buildings, whether architecturally aesthetic or not, and other kinds of artefacts surrounding us in the modern world as paradigmatic examples of cultural entities. When it comes to the borderline cases I find it reasonable to include cultural landscapes with domesticated animals and plants, and self-sustained ecosystems, though not pristine, into the group of natural entities. More difficult is to classify urban parks and the different kinds of ornamental plants and fishes. Nevertheless, as long as they include or represent living organisms, I think it is reasonable to include them as natural entities. I also choose to include mountains and non man-made spectacular sceneries as natural entities. What is clearly not perceived as natural entities, however, are cultural entities such as music, poetry, paintings, sculptures, theatres and sports arenas, and other technical man-made things like cars, roads, industry buildings, PCs, shopping centres and coffee bars.

For the purpose of the present investigation I have decided to use the term “ecological entity” when referring to all those kinds of nonhuman entities which I above group as natural entities. It should be kept in mind that some of the ecological entities might have cultural traits, such as for cultural landscapes and domesticated animals. Though individual humans and the species *Homo sapiens* in principle might also be regarded as ecological entities, they are in the present investigation excluded from the term. The reason is that the discussion of moral stakeholder status of ecological entities focuses on nonhumans, since I take it for granted or as a premise for the discussions that humans have a moral standing or status that makes them worthy as parties to care about when making ethical assessments about values at stake.

In short, this means that the term “ecological entity” will be understood to include nonhuman wild organisms, all kinds of cultivated and domesticated plants and animals, supra-individual ecological entities like species and ecosystems, including cultural landscapes, and non-living entities like rivers and mountains. The term “values behind biodiversity” thus refers to the different ways such ecological entities are valued.
As ecological entities of relevance for the present investigation I have decided, especially for the case study, to focus on the wild Atlantic salmon species, its habitats, commercial wild fish stocks, including fish stocks for local small-scale artisanal fisheries in developing countries and, finally, the farmed Atlantic salmon in Norway. These will be referred to in short as wild salmon, their habitats, commercial wild fish stocks and farmed salmon.

2.2 Research questions – moral stakeholder status, values behind biodiversity and moral duties

On the basis then of the above background information, the three research questions about moral stakeholder status, values behind biodiversity and moral duties will be described. It is, as mentioned, important to remember that the research questions should be seen in the context of the original goal to develop an ethical environmental accounting system for handling environmental controversies in relation to the Norwegian salmon farming industry. This means further that the theoretical handling of the three research questions through Parts I and II of the present investigation might be seen as a “theoretical loop” that is necessary to be completed before returning back to the original goal. I perceive this “theoretical loop” to be an important research goal in itself, as emphasised by denoting the development of the conceptual model as a primary goal.

The case study in Part III, which represents a practical test of the conceptual model developed on the basis of the research questions, brings us back on the road towards the original goal by presenting some practical conclusions in relation to the handling of environmental controversies. In this connection I specifically will bring attention to the last subchapter in Chapter 7 (Discussion and conclusions – ethical records and practical recommendations) where I make the practical recommendations regarding certain prioritised issues I believe are important for the Norwegian salmon farming industry to focus on when developing systems for ethical environmental accounting. As said before, I consider these practical recommendations to represent the most interesting part in the conclusions of the present investigation when viewed from the perspective and specific interests of the Norwegian salmon farming industry.
The first research question about moral stakeholder status focuses on whether some ecological entities should be valued non-instrumentally as ends in themselves. This means if some ecological entities should be regarded as moral stakeholders and secured sustainability because they have values as ends in themselves. In short this first research question is stated as a question of “Sustainability for whom?”. It should be recalled that moral stakeholders are defined as stakeholders that are perceived to have a moral standing or status that make them worthy as parties to take into consideration when making ethical judgements.

The second research question focuses on the range of values behind biodiversity apart from the moral stakeholder issue. The focus is particularly on values behind biodiversity related to moral stakeholders’ long-term needs and preferences, whether for humans only or also for ecological entities. These values might either be purely instrumental as resources for such as food, water, shelter, comfort and economic income, or cultural as entities for such as adventure, recreation and aesthetics. The different kinds of valuations should represent values that can be measured, counted or at least characterised in ethical environmental accounting. This second research question in short is stated as a question of “Sustainability of what?”.

On the basis of the answers given to the first two research questions, the third addresses moral duties that humans might have in relation to the sustainability of ecological entities. To demonstrate how these duties might vary according to how the research question of “Sustainability for whom?” is answered, the third research question will be discussed both for situations where only humans qualify for a moral stakeholder status and situations where also ecological entities qualify. This means situations where humans only have moral duties towards each other and situations where humans also have moral duties towards nonhuman moral stakeholders. The conceptual basis for these different situations is what is discussed by the development of the conceptual model in the “theoretical loop”.

The focus when discussing moral duties is on negative impacts on moral stakeholders’ needed and preferred values behind biodiversity. This is in accordance with the aim of ethical accounting, which I in Chapter 1 (Introduction – research area) say is primarily to avoid and solve interest controversies by reducing or avoiding negative impacts. The handling of the three research question is therefore limited to judgements of the different parties’ ethical records in relation to this.
The three research questions – *sustainability for whom, sustainability of what and ethical records?*

In order to handle the three research questions I have made the following more specific formulations:

**Moral stakeholder status** – “*Sustainability for whom?*”
May ecological entities, such as wild salmon, their habitats, commercial wild fish stocks and farmed salmon, qualify for a moral stakeholder status in relation to their needs and preferences for values behind biodiversity?

**Values behind biodiversity** – “*Sustainability of what?*”
What are the characteristics of the values behind biodiversity that moral stakeholders, whether human or nonhuman, need and prefer?

**Moral duties** – *ethical records*
What moral duties in relation to moral stakeholders’ needed and preferred values behind biodiversity follow from the two first research questions?

These are then the questions that are handled in the theoretical discussions of Part I and II of the present investigation, which ultimately ends up with the conceptual model. Thereafter in the case study of Part III the more practical implications of and answers to the research questions are given.

**Suggested answers – personal perceptions or hypotheses**
The following are my suggestions for answers to the three research questions:

**Moral stakeholder status** – “*Sustainability for whom?*”
Theoretically and philosophically I recognise that some and even all ecological entities may be ascribed direct moral status values that qualify for a moral stakeholder status. In practical ethics, however, I find it difficult to talk about moral stakeholder status of ecological entities. This is especially so in light of the practical consequences which logically follow from it, and what that might imply for human flourishing.
Values behind biodiversity – “Sustainability of what?”

I believe that the characteristics of the values behind biodiversity that humans need and prefer are firstly of the biological kind to secure survival, growth and reproduction. I think then of purely instrumental values such as food, water, shelter, comfort and economic income. Secondly are the cultural kinds of needed and preferred values behind biodiversity, which involve such as adventure, recreation and aesthetics.

For ecological entities I believe that needed and preferred values behind biodiversity are primarily, and perhaps only, of the biological kind.

Moral duties – ethical records

If some or all ecological entities qualify for a moral stakeholder status, then I think that humans will have direct moral duties towards them. These will be moral duties linked to these ecological entities’ needed and preferred values behind biodiversity. Central in this connection is to avoid harm and secure equity for all the moral stakeholders.

If, on the other hand, ecological entities do not qualify for a moral stakeholder status, then humans may have indirect moral duties towards them. These will be moral duties linked to humans’ needed and preferred values behind biodiversity. Also in this connection the avoidance of harm and securing of equity will be central, but then only for humans.

The three suggested answers might perhaps be seen as a set of hypotheses, but are in fact reflective syntheses of my personal perceptions with regard to the issues handled by the research questions. This implies that the suggested answers are based on a web of observations and reflections both before, in the planning of and actually also during the investigation process. In this sense, the suggested answers might just as well be seen as preannounced statements of my conclusions or as hints of what the discussions in the present investigation turn around.

This character of the suggested answers entails that they will not be verified in a strictly hypothetical-deductive way. By this I mean that the answers in a formalistic sense do not represent hypotheses that can be verified by a set of scientifically reproducible observations.
Their reasonableness and relevance will instead be qualified, elaborated and supported by a web of observations and reflections throughout the investigation. This represents a process that to some extent resembles the so-called method of reflective equilibrium, the totality of which might be judged by the internal coherence of these observations and reflections (Føllesdal et al. 1996). Instead of a systematic step-by-step verification, therefore, the reasonableness and relevance of my suggested answers to the research questions will in various ways be demonstrated by the way the issues in question are elaborated and discussed in the different chapters of the present investigation. There should be no surprise that I will in general conclude that my suggested answers are both reasonable and relevant since they, as mentioned, are influenced by the investigation itself. The outcome is therefore rather to show how and why my suggested answers might be seen as reasonable and relevant. The theoretical part of this will, as also mentioned, be handled in Parts I and II, while the case study in Part III will be a practical demonstration.

**Research questions – where to find input, comments and answers?**

Since the present investigation then does not contain a systematic step-by-step verification of the reasonableness and relevance of my suggested answers to the research questions, I will briefly describe where input, comments and answers to the three research questions are found.

Already in the description of the mentioned flourishing matrix of the conceptual model in Chapter 3 (Method – *a post-normal science approach*), some input is given to the research question of “Sustainability of what?” This is because the flourishing matrix identifies values behind biodiversity of interest for human flourishing, and thus values that are of interest to sustain. Further, linked both to the research question of “Sustainability for whom?” and the research question about moral duties, the explanation of and rationale for using the term “direct moral status value” is described.

Chapter 4 (Sustainability Context – *contemporary perceptions*) basically deals, by the discussion of the Sustainability Context, with a testimony of whether the research questions have any relevance at all.

Chapter 5 (Conceptual model – *a primary goal*) follows with particular focus on the research question of “Sustainability for whom?”, and thus with input to the reasonableness and relevance of my suggested answer to this research question. This relates particularly to my
notion that theoretically and philosophically some and even all ecological entities may be ascribed direct moral status values that qualify for a moral stakeholder status. The difficulty in talking about moral stakeholder status of ecological entities in light of the practical consequences which logically follow from it is also addressed in this chapter. The reasonableness and relevance of my suggested answers to the other two research questions is also demonstrated through the discussions in Chapter 5 (Conceptual model – a primary goal).

After these theoretical inputs, comments and answers to the research questions follow some more practical inputs through the case study in Part III. This is the place where I after the “theoretical loop” return back on the road towards the original goal of the present investigation by making the practical recommendations.

Chapter 6 (Examination and results – values behind biodiversity) gives in particular practical input to the reasonableness and relevance of my suggested answers to the research questions of “Sustainability for whom?” and “Sustainability of what?”. This is done by demonstrating the variety of expressions describing values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon.

Chapter 7 (Discussion and conclusions – ethical records and practical recommendations) primarily handles the research question about moral duties. This is done by the judgements of ethical records. Some final conclusions with regard to the reasonableness and relevance of my suggested answers to all the three research questions in general are also given in Chapter 7 (Discussion and conclusions – ethical records and practical recommendations).

At the end of Chapter 7 (Discussion and conclusions – ethical records and practical recommendations) I add the mentioned practical recommendations regarding certain prioritised issues I believe are important for the Norwegian salmon farming industry to focus on when developing systems for ethical environmental accounting. These might be seen as a kind of practical wrapping up of the case study and a synthesis of practical consequences that follow from the theoretical discussions in Part I and II of the present investigation.

**Remarks – read Epilogue?**
The basic ethical challenge related to the three research questions, as I see it, is equity. I think then of fair distribution of and access to values behind biodiversity that are necessary to
secure survival, growth and reproduction of all moral stakeholders, both for current and future
generations. One question is if there would be resources left for human cultural activities, if
many or all ecological entities should qualify for a moral stakeholder status and thus be
entitled to their fair share of natural resources. Even if only humans qualify for a moral
stakeholder status, there might still be a question of resources left for human cultural activities
if all humans should be secured basic life support needs for survival, growth and reproduction.

To the extent there are natural resources available for human cultural activities, the next
question is whether humans prefer comfortable housing, good roads, nice parks and tranquil
coffee bars, before the values behind wild nature, and if that might be ethically justifiable.

These questions are basically what the present investigation is about. In “Part IV: Epilogue –
so what?” I present, as mentioned, some final reflections about this. The three questions
discussed there about cultural landscapes versus farming salmon, wild salmon versus the
minnow species, and animal welfare versus salmon game fishing might, I say, be seen as a
general synopsis of the present investigation. For those who want to be a little prepared for
what is to come in the following chapters, it might therefore be of interest to read the epilogue
first – with an open mind!
3. Method – *a post-normal science approach*

The present investigation builds, as mentioned in Chapter 1 (Introduction – *research area*), on the post-normal science approach and the ideas of participatory processes. Since this then has influenced the methodological design of the present investigation, I will briefly summarise what participatory processes and post-normal science are about before describing the method.

The basic idea of participatory methods or processes is, as mentioned in Chapter 1 (Introduction – *research area*), to involve stakeholders and laypeople in ethical assessments and judgements of value questions. This is often termed as bottom-up oriented processes, run through such as consensus conferences and citizen panels (Forsberg and Kaiser 2000 p.3-5). The post-normal science approach can be characterised as participatory since it according to Funtowicz and Ravetz (1993 p.752) involves the inclusion of an ever-growing set of legitimate participants.

Funtowicz and Ravetz (ibid. p.739-740) use the two attributes of system uncertainties and decision stakes to distinguish between post-normal science and the “normal” science. The reason why we need a new science, they (ibid. p.742) explain, is that we face radical uncertainty and even ignorance, as well as ethical uncertainties lying at the heart of scientific policy issues. The emerging post-normal science is therefore developed in response to the challenge of handling complex policy issues such as in the fields of risk and the environment, Funtowicz and Ravetz (ibid. p.739, 754) say. In the normal state of science, they (ibid. p.740) say further, uncertainties are managed automatically, values are unspoken, and foundational problems are unheard of. Funtowicz and Ravetz (ibid. p.750-751) refer to this as the traditional fact/value distinction in science. The paradoxical feature of post-normal science, as they describe it, is that it in its problem-solving activity has inverted the traditional domination of ‘hard facts’ over ‘soft facts’. These two fact categories have not only been inverted, Funtowicz and Ravetz add, they have been placed side by side, because in post-normal science the two cannot be realistically separated.

Funtowicz and Ravetz (ibid. p.740) say further that the new methodology focuses on two aspects. One is the quality of scientific information, analysed in terms of both the different types of uncertainty in knowledge and the intended functions of the information. The other relates to problem-solving strategies, analysed in terms of uncertainties in knowledge and
complexities in ethics. They (ibid. p.739) state that this new type of science requires an extended peer community in the quality assurance of scientific inputs to policy processes. This is because the emergent complexity provides a theoretical justification in which the peer community for quality assurance is expanded beyond the certified experts to include all those with a stake in the issue, they (Funtowicz and Ravetz 1994 p.578) explain further. This they (1993 p.741) describe as some kind of a democratic element in the life of science. The extension of the peer community is according to Funtowicz and Ravetz (ibid. p.753) not merely an ethical or political act. It can positively also enrich the processes of scientific investigations through those whose lives and livelihoods depend on the solution of the problems.

In addition, as a basis for the methodological design of the conceptual model, and actually a motivation for developing the model, is the recognition mentioned in Chapter 1 (Introduction – research area) that there is pluralism of values in societies. This means, as I understand it, that humans probably have different perceptions with regard to moral stakeholder status, values behind biodiversity and moral duties related to such values. The intention of the conceptual model is therefore to help identify these different perceptions. Further, I say that the primary goal of the model is to help create a mutual understanding of what these differences are, and as a best-case scenario I see common understandings and agreements of value perceptions.

It should be recalled that all discussions in the present investigation, as indicated in the first two research questions of “Sustainability for whom?” and “Sustainability of what?”, are done within the framework of the context I term the “Sustainability Context”.

On the basis then of the post-normal science approach, the ideas of participatory processes, the recognition that there are pluralism of values in societies and the focus on sustainability, the different parts of the method of the present investigation will be described in the following three subchapters. The first subchapter describes the methodical structure of the Sustainability Context handled in Chapter 4 (Sustainability Context – contemporary perceptions). The second subchapter describes the basic elements used for the development of the conceptual model in Chapter 5 (Conceptual model – a primary goal), while the final subchapter presents a methodical description of the case study in Part III.
Before describing the different parts of the method, the Parts I, II and III and the attached chapters of the present investigation are shown again in mind photo 3.1 as a help to remember how they relate to each other.

**Mind photo 3.1** Investigation parts – *Part I, Part II and Part III*

The mind photo shows that the method, including the research questions and the introduction in Part I, constitute a methodical basis for how the case study is done in Part III. They constitute also a basis for the discussion of the Sustainability Context and the development of the conceptual model in Part II. Further it shows that also the Sustainability Context and the conceptual model play a role as parts of the methodical basis of the case study in Part III.

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4 As mentioned in Chapter I (Introduction – *research area*), I have chosen to use what I call mind photos when trying to visualise my thoughts and perceptions. These might be understood as kind of mind charts or sketches showing the logics and contents of my ideas.
It should be remembered that the reference list of the present investigation is split into two parts. The first part is “References I – except references used exclusively for the examination” and the second is “References II – references used exclusively for the examination”.

Additionally, it is worth mentioning that all reflections, references and citations will grammatically be made in the present tense. I have further decided to use single quotation marks to indicate direct citation⁵ and double quotation marks when mentioning terms⁶.

### 3.1 The Sustainability Context – methodical structure

The discussions of the research questions, as well as the examination, the judgements of ethical records, the verdicts and the suggestions of ethical goals in the case study are all, as mentioned, done within the framework of the Sustainability Context.

The main parts of the Sustainability Context are, as shown in mind photo 3.2, the Cultural Element, the Ecological Element, the Ethical Element, the Harm Principle and the Equity Principle. The latter two parts represent the framework for the judgements of ethical records.

**The Cultural Element – values behind biodiversity**

The Cultural Element at the bottom of mind photo 3.2 deals with the whole range of values behind biodiversity. This involves the two research questions of “Sustainability for whom?” and “Sustainability of what?”. The first is, as mentioned, the question of whether some ecological entities might qualify for a moral stakeholder status or not. The other is the question dealing with biological and cultural flourishing, and needed and preferred values behind biodiversity in this connection.

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⁵ To illustrate: In the present investigation I wrote that ‘I have further decided to use single quotation marks to mark direct citation’.

⁶ To illustrate: The term “double quotation marks” is used when explaining about quotations in the present investigation.
The Ethical Element – *ethical records*

The third research question is about moral duties addressed on the basis of the answers given to the first two research questions. This is represented by the Ethical Element at the top of the mind photo and deals with moral duties in relation to impacts on moral stakeholders’ needed and preferred values behind biodiversity. These are moral duties that might follow from positions or perceptions about moral stakeholder status. By moral duties I think of duties with regard to the flourishing of moral stakeholders, and thus their needs and preferences for values behind biodiversity. Assessments of such moral duties are, as mentioned in Chapter 2 (Research questions – *values behind biodiversity and moral duties*), limited to judgements of
ethical records related to negative impacts on values behind biodiversity caused by different parties’ activities and agendas.

In between the Cultural Element and the Ecological Element are the Ecological Element, the Harm Principle and the Equity Principle.

**The Ecological Element – knowledge base**
The Ecological Element deals primarily with the need for awareness of the complexities of ecosystems and the uncertainties with regard to their processes. These represent a knowledge base that is necessary to take into consideration in the judgement process when deciding acceptable levels of impacts on ecosystems. As I see it, this calls both for science to acquire more knowledge about ecosystem functioning and structure, and for the precautionary principle to be applied when deciding what risks to accept with regard to impacts on ecosystems.

**Values and knowledge – the role of science and the precautionary principle**
The link between the Cultural Element and the Ecological Element is made to demonstrate that it is necessary to be aware of and take into consideration the valuations of ecological entities when prioritising scientific efforts in improving the knowledge base. This refers to the question of moral stakeholder status and values behind biodiversity handled in the Cultural Element. These valuations are probably decisive for what is perceived as acceptable levels of impacts on ecosystems.

This, I believe further, also contributes to the awareness of the need of the precautionary principle and the situations where it should be applied. The link, therefore, between the Cultural Element and the Ecological Element, in addition to the role of science, also demonstrates that the precautionary principle should be applied. The precautionary principle is, as I see it, about what risks societies are willing to accept with regard to impacts on ecosystems and the sustainability of the values behind biodiversity.

**Framework for the judgements of ethical records – the Harm Principle and the Equity Principle**
I have chosen what Westra (1994 p.191) calls the Harm Principle and the Equity Principle to represent what I denote as the framework for the judgements of ethical records in the present
investigation. She (ibid. p.191) says that these two principles are important when dealing with policy options. On the basis of the values behind biodiversity of the Cultural Element and the knowledge base of the Ecological Element, the Harm Principle and the Equity Principle thus give directions for whether ethical records should be judged to be weak, neutral or strong. These are then judgements related to the needs and preferences of moral stakeholders.

**Ethical judgements – good is good**

The judgements of ethical records will be based on perceptions of whether activities and agendas are good or bad. Activities and agendas that are good result in a judgement of a strong ethical record, while those that are not so good, or rather bad, will result in a weak ethical record. There will also be some activities and agendas that are neither specifically good nor bad, which will result in a neutral ethical record. The perceptions of what is “good” will fully be left to the participants’ opinions or understanding, which for the case study is me. Here it is necessary to trust that everyone more or less knows what “good” is. This is just as it is when Moore (1903 p.12-14) says that since pleasure is pleasure and nothing else, and that “yellow” means “yellow” and nothing else, then why should it be different with “good”.

**The Harm Principle – no-harm and quality**

The Harm Principle might be said to represent the ethical value of non-malevolence. In the context of the present investigation the focus is to avoid that moral stakeholders are harmed by ecosystem goods and services of inferior quality. This is not about harm in the sense of unfair distribution of and access to values behind biodiversity. It is about harm caused by the quality of ecological entities. Two kinds of harm are handled. One kind is about dangerous and unsafe conditions, where there either is a downside harm condition or a neutral no-harm condition. To some extent this might be seen as a dichotomy with harm on one side and no-harm on the other. The harm could be such as if farmed salmon should be unsafe to eat because it is contaminated by a toxin, or if climate change should increase the frequency of dangerous weather conditions. The other kind of harm is if the quality of some values behind biodiversity is reduced and becomes lower than what is expected. An example of this might be such as if the health quality of farmed salmon, due to reduced Omega-3 content, should be lower than expected, and thus reduce the expected positive health effects. In such cases there might in addition to harm and no-harm, be an upside condition where the quality is better than expected. Such a situation is if the contents of Omega-3 are higher than normally accepted or that the contents of contaminants are far below the accepted safety level. This might be seen
as a polar situation with one negative and one positive condition, and a neutral condition in between. In principle, however, there are no differences in the scale used to describe the two kinds of harm. The difference between them is that the first one, the dichotomy, does not include the upside or positive part of the scale such as the polar one does.

The reason for mentioning the two kinds of harm is to draw attention to the significance it has for the practical judgements of ethical records. In the first case, where there are only harm or no-harm conditions, the judgements of ethical record would be weak and neutral respectively. Judgements of strong ethical records will not be made because it seems illogical to say that something is safer than safe. The other kind of harm might, however, be judged to give a strong ethical record if the quality is better than expected. This means that the best achievement in relation to the first kind is a neutral ethical record, while the best for the second kind is a strong ethical record.

The Equity Principle – *fair distribution and substitutability*

The Equity Principle might be said to represent the ethical value of fairness and justice. In the context of the present investigation the focus then is to secure fair distribution of and access to needed and preferred values behind biodiversity, both for present and future generations. In addition, the Equity Principle includes substitutability. For example, when securing equity in relation to access to necessary life support food sources, this might be achieved by use of different kinds of food as acceptable substitutes for what originally might have been a food source. Substitutability, as used in the present investigation, might be seen as an extended version of the polluter pays principle (Dommen 1993 p.1). If a negative impact on ecological entities cannot be abated, the polluter pays principle opens for the use of economic compensation as an ethically viable substitute for damage caused. It is this kind of thinking, where something is used to compensate for the loss of something else, that I refer to as substitutability. I also use the term in situations where something is sacrificed for the purpose of achieving something else. This will be discussed further in Chapter 4 (Sustainability Context – *contemporary perceptions*).

I perceive the fairness and justice part and the substitutability part of the Equity Principle respectively to have similarities with the Aristotelian distributive justice and corrective justice (Thommessen and Wetlesen 1996 p.188).
For the Equity Principle, there will always be judgements of strong, neutral or weak ethical records. This is because impacts on the distribution of and access to values behind biodiversity are always good, neutral or bad in relation to a standard original state. Activities and agendas that help create a widest and best possible fulfilment of biological or cultural flourishing will give strong ethical records. This means improvements of the access to needed and preferred values behind biodiversity. It could either be by improving the access to the ecological entities that traditionally create the specific values or by offering acceptable substitutes. Activities and agendas that limit or hamper the access to values behind biodiversity that contribute to flourishing will give weak ethical records, if acceptable substitutes are not offered. If there is no difference from a standard original state, then the records are neutral.

An example of such judgements is the personal interests that wild salmon game fishers have in continuing to enjoy their traditional activities, versus the economic interests of salmon farmers to secure their own livelihood and welfare through profitable salmon production. In some situations the Norwegian salmon farming industry might be judged to have a strong ethical record because it increases the living standards of many people in coastal areas, while the pleasure of salmon game fishing is the privilege of only the few. In another setting the wild salmon interests might be judged to have a strong ethical record, both because they help fulfil Norway’s duties in relation to the Convention on Biological Diversity and because wild salmon is after all a fascinating animal that many people admire and that might even have some symbolic value for Norwegian identity. This could then be valued higher than the local socio-economic benefits of salmon farming.

I find it natural for judgements in relation to the Equity Principle that priority is given to values behind biodiversity needed to secure survival, growth and reproduction. This means that priority should be given to basic needs, such as necessary life support food, before non-basic or luxury values behind biodiversity.

3.2 The conceptual model – methodical structure

The intention with the development of the conceptual model is, as mentioned in Chapter 1 (Introduction – research area), to have a tool for identifying possible value grounds for
ethical environmental accounting. This involves sorting out how ecological entities might be valued, and how that creates a basis for assessments of moral duties in relation to the sustainability of such values. As such the conceptual model plays a role in the case study as the methodical basis for the judgement process. This is in the sense of clarifying which ecological entities might qualify for some kind of moral stakeholder status, and which values behind biodiversity are at stake.

It is because of this need for a tool to help identify possible value grounds for ethical environmental accounting I, as mentioned, denote the development of the conceptual model as a primary goal of the present investigation.

It should be recalled that the term “conceptual” is used to express that the model should be seen as a kind of framework or structure for how such models can be developed and constructed. This is done so because it is practically impossible within the limits of the present investigation to cover all different kinds of philosophical theories about environmental ethics that might have relevance for the research questions of “Sustainability for whom?” and “Sustainability of what?”. The conceptual model should therefore be seen as a suggestion of how such theories might be handled more than a completely developed tool kit.

It should further be recalled that the conceptual model has two elements. One is an inner worth table, which is meant to handle the research question of “Sustainability for whom?”. This means to help distinguish and clarify whether any ecological entities might qualify for a moral stakeholder status. The other element is a flourishing matrix. The main objective of the flourishing matrix is to handle the research question of “Sustainability of what?”. This means to help identify and characterise the kinds of values behind biodiversity that might be of interest for moral stakeholders.

Logically, the question of moral stakeholder status should, through the inner worth table, be clarified before using the flourishing matrix to identify the values behind biodiversity of interest for the moral stakeholders. For the explanation of the methodical structure of the conceptual model, however, it is best to start with the flourishing matrix.
It is important to be aware that the flourishing matrix is developed and described in full here in this chapter, while the inner worth table, on the basis of the methodical structure described in the present chapter, is developed fully in Chapter 5 (Conceptual model – a primary goal).

### 3.2.1 Flourishing matrix – fulfilment of life potentials

The term flourish or flourishing, when used in the environmental literature, is often associated with an individual’s ultimate life expectance or as an expression related to the fulfilment of life potentials on Earth (Næss 1986 p.14, Rolston 1988 p.4, Wetlesen 1996 p.62, Callicott 1998a p.14). In The New Oxford Dictionary of English (Pearsall 1998 p.706) the verb flourish is described as the status of a person, animal or other living organism when they grow or develop in a healthy or vigorous way, especially as the result of a particularly congenial environment. The term flourishing potentials will in the present investigation be used as a combined term to express flourishing and life potentials of humans and of ecological entities, whether individual or supra-individual.

The intention of the flourishing matrix is, as mentioned, to help identify and characterise the various values behind biodiversity that might be of interest for moral stakeholders. To do this, the flourishing matrix contains a list of selected types of values behind biodiversity. This list should ideally be comprehensive enough to cover the whole range of possible values behind biodiversity, but at the same time short enough to be manageable. Such a list, which I perceive at least to be comprehensive enough, is presented by Rolston (1988 p.3-26), who has made an inventory of how nature is valuable to humans. This inventory contains 14 different value types, representing the various ways that humans may value biodiversity. These value types are shown in mind photo 3.3, as the first step in the development of the flourishing matrix.

Before referring to how Rolston describes each of the value types in his inventory list, some general comments will be given to how Rolston’s intentions with this inventory relates with the intentions of the conceptual model.
Mind photo 3.3 Flourishing matrix – development stage I

Flourishing matrix – development stage I 
Values behind biodiversity

Value types
Rolston’s inventory list of how nature is valued by humans
Life support
Economic
Recreational
Scientific
Aesthetic
Genetic-Diversity
Historical
Cultural-Symbolization
Character-Building
Diversity-Unit
Stability and Spontaneity
Dialectical
Life
Religious

Rolston (1988 p.2) comments that one striking thing about humans in relation to the natural environment is the richness of their uses of it. Seeing the inventory list from the perspective of nonhumans, however, it might be added that it is striking how few of the value types listed seem to have any relevance for nonhumans. Rolston (ibid. p.2) says in connection to this that ‘nature carries for humans a vast array of values little shared by other species’. This human perspective could both for Rolston’s discussion and for the present investigation be interpreted as taking an anthropocentric approach. This is, however, not the case, neither for Rolston nor for the present investigation. Rolston says that beginning from an account of how humans value nature ‘will prove a strategic entry point into a primary environmental ethics’. Similarly it is my intention to start the elaboration about values behind biodiversity from the familiar human perspective and then expand into a more balanced holistic view.

By primary environmental ethics Rolston (ibid. p.1) means an ethics related to ‘questions not merely of prudential use but of appropriate respect and duty’. He says that terms like rights, justice, beneficence and maleficence, social contracts, promises, benefits and costs, utility, altruism and egoism are regularly used in traditional human ethics. For primary environmental ethics, he (ibid. p.1-2) emphasises, it is in addition necessary to clarify whether nature has intrinsic value. It will be from this value that we will derive duty, he concludes. This means, he (ibid. p.3) says further, that as the valued functions of nature are uncovered, ‘we can begin to press the question whether and how far value intrinsic in nature enables humans to come to
own these values’. Another comment that shows Rolston’s intention of moving away from the human perspective is when he brings attention to the fact that every living thing, and not only humans, exploits its environment for biological needs (ibid. p.2).

Rolston touches upon the question I have addressed about the use of buzzwords in contrast to more prosaic, economy-related value terms, and also the need to identify values behind biodiversity. This therefore both supports the intentions of, and gives input to, the development of the conceptual model in searching for answers to the two research questions of “Sustainability for whom?” and “Sustainability of what?”.

**Inventory list – 14 value types**

Each one of the value types of Rolston’s inventory list will be described in the following, along with the further stages in the development of the flourishing matrix.

**Life support values:**

Rolston (1988 p.3-5) mentions things like airflow, water cycles, sunshine, soils and food chains as examples of life support values. The basic and universal character of these values is by Rolston expressed by the wonder that we find ourselves alive and well in a life support system that ‘can evolve and sustain such a flourishing of life’. He reflects further on this by referring to the fact that not only humans have prospered here, but also that ‘myriads of species have found satisfactory environments, life support niches, into which they are well fitted’. He uses this recognition to state that the human conscious appreciation of the life support values are a subset of the larger, objective production of values in place on Earth before humans arrived. This might imply that the life support values represent different goods and services of importance for the growth, survival and reproduction not only for humans, but for most individual ecological entities, and if seen in the widest context, also for supra-individual ecological entities.

**Economic values:**

In relation to the economic values, Rolston (ibid. p.5-7) says that any living thing makes its environment into a resource, like when a squirrel hides a cache of acorns and a bird builds a nest. However, for nonhumans, he denotes that ‘these activities still involve ecologies, hardly yet economies, unless we choose to call all questions of efficient food and energy use economic’. Economic values as understood by Rolston, therefore, are typically associated
with human activities. Achieving economic value in the usual sense, Rolston says, involves the deliberate redoing of natural things by changing them from spontaneous nature, and then coupling such remade things with commercial activities. The contrast here, he comments, is that animals do not exchange goods in markets, while markets are basic to every human culture.

Recreational values:
The recreational values are referred to by Rolston (ibid. p.7-8) as fields for skills and contemplation. By fields of skills he means places to perform outdoor activities where the participants can show each other ‘what they can do’, as for example in climbing and setting up a camp. The field of contemplating is more about enjoying nature’s beauty. This is what Rolston calls ‘[letting] in on nature’s show, as when listening for the bull elk to bugle or admire the aerial skill of a hummingbird’. Rolston refers to the skill field as the gymnasium part of the recreational values, and contemplation as the theatre part.

Scientific values:
For the scientific values Rolston (ibid. p.8-10) states that they are in alliance with naturalistic recreation. Their origin was a leisure pursuit, and it is our latest and perhaps most sophisticated cultural achievement, he explains. By filtering out all applied values of natural science, he says, one reaches a residual scientific value in nature. This represents then an intrinsically worthwhile activity, just like music and the fine arts. A good test for pure science, he says further, is to ask whether scientists would continue their research if they were independently wealthy and if the research had no economic or life supporting consequences. The question in short is whether one does science for play or for pay, he concludes, accusing recent science of having sold its soul to economists. This distinction between science for play and science for pay might be seen as representing the Aristotelian view that science is about human flourishing on the one side and the Baconian view that science primarily should be useful as a utility tool on the other side (Kaiser 2000 p.36-39).

Aesthetics values:
When discussing aesthetics, Rolston (1988 p.10-12) says that the intrinsically intellectual stimulation that the pure scientists defend is parallel to what the aestheticians defend. The difference is that science tells the story as it actually is and art as it ideally ought to be. But this is not always entirely so, he comments, because art can enjoy the particularity of things
while science typically seeks a universal law to which no particular thing or event ever quite conforms. In this connection he says that the disappearance of any species represents a great aesthetic loss for the entire world. Further, by reference to Cézanne and Monet, Rolston says that painters may help us to capture qualities in nature by exaggerations. He asks then whether aestheticians repair nature before appreciating it, and replies himself that what artists do is rather to see the biological ideal, rarely reached, toward which a living thing is striving.

Genetic-diversity values:
Rolston’s (ibid. p.12-13) genetic-diversity values are about gene reservoirs and their usefulness for living organisms in general and how they end up carrying economic value for humans. In a reflection about the value of genetic material, he says that it has been naturally selected, with the result that it serves the good of organisms, whether or not humans ever use it.

Historical values:
The historical values of nature, Rolston (ibid. p.13-15) says, is about knowing where we come from and who we are. This can be interpreted as a kind of symbolic or identity-shaping value. He expresses this by saying that a historical narrative tells a story about what happened once upon a time, and the potential meaning of these events. Elaborating further on what might be the meaning or value of life, he says that in the ‘museum of natural history’, we may come to recognise intrinsic value in the natural processes that still survive in remnant wild and rural areas.

Cultural-symbolisation values:
By the cultural-symbolisation values of nature, Rolston (ibid. p.15-16) refers to how different ecological entities give identity and self-images to a community. He refers to things like the symbolic value of the maple leaf for Canada, the alligator for Florida, the moose for Maine, the bald eagle for America and the bear for Russia. Linked to this he states that no culture develops independent of the environment on which it is superimposed, and that there in the understory on which a society develops are always distinctive landscape features with which it interacts.
Character-building values:
When discussing the character-building values of nature, Rolston (ibid. p.16-17) refers to how scouts, Outward Bound and other such organisations use wildlands to build character. Wildlands and nature is a place to sweat, push oneself and gain humility and a sense of proportion, and is eventually a place to ‘know thyself’, as Rolston expresses it. He holds that nature has a therapeutic value and that a majority of humans, when using wild and rural areas, do this for semi-therapeutic recreation in a low-frustration environment.

Diversity-unit values:
The diversity-unit values are about the scientific realisation that ‘the world is simple in principles and rich in phenomena’, Rolston (ibid. p.17-19) states. This is represented by DNA and RNA as the core of life and the diversity of life forms evolved from this. Rolston stretches this by bringing attention to how both diversity and unity feed the human mind.

Compared to the other value types described so far, I have difficulties in grasping fully what diversity-unity values are about. In some way I believe they might relate to the genetic-diversity value type.

Stability-spontaneity values:
When discussing the stability-spontaneity values of nature, Rolston (ibid. p.19-22) refers to the value of order and the value of freedom. As a product of chance mixed with natural stability and evolutionary trends, living things gain a partial integrity to go on their own, he says, by seeking help and avoiding harm in a mixed, stable and contingent environment. In this kind of reality we both value the regularity and the wildness of nature, Rolston says, concluding that we do not want order at the expense of spontaneous novelty, but rather ‘constancy with contingency’.

As above, I also have difficulties in grasping what this value type is really about.

Dialectical values:
Rolston (ibid. p.22-23) explains the dialectical values of nature by the contradictory forces in and the antagonistic nature of the environment, recognising that an entirely hostile environment would slay us and an entirely peaceful, or irenic one, as Rolston says, would stagnate us. Humans should therefore respect the alien in nature with special emphasis on its
stimulus, provocation and opposition, Rolston says, and links this to the difficult maxim of loving one’s enemies.

As for the two former value types, I have difficulties in fully understanding what Rolston is aiming at in his description of dialectical values. In comparing the last two value types with the others described by Rolston, I have a feeling that they might be connected with the character-building values.

Life values:
Reverence for life is commented by every great religion, and even moralists who shy from religion accord life ethical value, Rolston (ibid. p.23-25) says. The human mind is the most interesting and presumably the rarest thing in the universe, but life is the second rarest phenomenon, he says further, stating that this alone should be a good reason to prove it of interest. All life is natural, which makes it an unequivocal natural value, Rolston contends, pointing at some of the core elements that will receive much attention during the discussion of moral stakeholder status in Chapter 5 (Conceptual model – a primary goal). These are the questions of whether only human life has non-instrumental value as an end in itself or if ‘every specific individual in some degree instances this value’, as Rolston expresses it. Rolston concludes that a principle task in ethics is for humans to find a suitable place for the integrity of other forms of life.

Religious values:
Rolston (ibid. p.25-27) links the religious value type to things like mountaintops, sunsets and canyons, which can generate experiences of a motion and a spirit that impels and flows through all things in a way that it becomes sacred. He sees nature as a religious resource, as well as an aesthetic, scientific, recreational and economic one, and as a place to escape from the secular city, and a sacrosanct, holy place where we can get near to ultimacy.

**Grouping of the value types – life, biological and cultural**
As said initially, I find Rolston’s inventory list comprehensive enough for grouping the values behind biodiversity into a relevant range of value types. However, for the flourishing matrix I find that 14 value types are a little too many to handle. The next step in the development of the flourishing matrix is therefore to reduce the number of value types by merging some of
them together. By this I still keep the content of the inventory list, but reduce the number of value types listed.

The first five value types of Rolston’s inventory, the life support, economic, recreational, scientific and aesthetic values, and the last two, the life and religious values, are all rather distinct and relatively self-explanatory terms that I think are relevant value types for the grouping of values behind biodiversity. The only comment is that while Rolston to a great extent describes the aesthetic values of nature as a source of inspiration for art expressions, I also think just as much of the direct enjoyment of nature’s beauty.

Among the seven other value types, the meaning of four of them are relatively easy to grasp, while I found it difficult to see the full meaning of the diversity-unit, the stability-spontaneity and the dialectical value types. Since I believe that the diversity-unit value type in some way might be related to the genetic-diversity value type, I find it convenient to merge them into an evolutionary value type. The other five value types I have merged into a symbolic value type, since I think they all have something to do with creating identity, culture and character. One exception is the character-building value type, which with the reference to the therapeutic value also has some linkages to the recreational value type.

It is debatable whether the religious value type should also be included under the symbolic value type. I have, however, found it best to keep them apart. This is partly because the religious value type, in addition to religion in the strictest sense, might also include different kinds of spiritual or supernatural beliefs.

The simplification of Rolston’s inventory, as described above, could then be arranged as shown in mind photo 3.4. The diversity-unit, the stability and spontaneity, and the dialectical value types are put in brackets since I have some difficulties understanding what they really are about.
Flourishing matrix – development stage II

Flourishing matrix – development stage II
Values behind biodiversity

<table>
<thead>
<tr>
<th>Value types</th>
<th>Simplified inventory list</th>
<th>Rolston’s inventory list of how nature is valued by humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life support</td>
<td>Life support</td>
<td>Life support</td>
</tr>
<tr>
<td>Economic</td>
<td>Economic</td>
<td>Economic</td>
</tr>
<tr>
<td>Recreational</td>
<td>Character-Building</td>
<td>Character-Building</td>
</tr>
<tr>
<td>Scientific</td>
<td>Scientific</td>
<td>Scientific</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>Aesthetic</td>
<td>Aesthetic</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Genetic-Diversity</td>
<td>Genetic-Diversity</td>
</tr>
<tr>
<td>Symbolic</td>
<td>Historical</td>
<td>Historical</td>
</tr>
<tr>
<td></td>
<td>Cultural-Symbolization</td>
<td>Cultural-Symbolization</td>
</tr>
<tr>
<td></td>
<td>Character-Building</td>
<td>Character-Building</td>
</tr>
<tr>
<td></td>
<td>(Stability and Spontaneity)</td>
<td>(Stability and Spontaneity)</td>
</tr>
<tr>
<td></td>
<td>(Dialectical)</td>
<td>(Dialectical)</td>
</tr>
<tr>
<td>Religious</td>
<td>Religious</td>
<td>Religious</td>
</tr>
<tr>
<td>Life</td>
<td>Life</td>
<td>Life</td>
</tr>
</tbody>
</table>

Flourishing matrix – life, biological and cultural domains

Returning to the notion that few of the value types listed seem to have any relevance for nonhumans, the next stage in the development of the flourishing matrix is to sort out what is human-specific and what is of interest for ecological entities. To do this, the value types are split into three domains. These are the life, the biological and the cultural domains. Among these, the life and biological domains contain values behind biodiversity that are relevant for both humans and nonhumans, while the cultural domain only contains values that are relevant for humans.

The life domain contains the life value type, and thus, as Rolston expresses it, the questions of whether only human life has non-instrumental value as an end in itself or if every nonhuman individual also in some degree instances this value. This means that the life domain represents ecological entities that might be valued to have life values as ends in themselves. The life domain addresses therefore the research question of “Sustainability of whom?” about moral stakeholder status, and links to the inner worth table.

Since the question of moral stakeholder status should be clarified before identifying the values behind biodiversity of interest for the moral stakeholders, the life domain is, as shown in mind photo 3.5, moved to the top of the list and separated from the others by a line. This position at
the top is therefore meant to visualise that clarification of whether or not an ecological entity qualifies for moral stakeholder status is essential for the process further.

**Mind photo 3.5** Flourishing matrix – *development stage III*

| Value types | Flourishing matrix – *development stage III*  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Life domain</td>
<td>Values behind biodiversity</td>
</tr>
<tr>
<td>Life</td>
<td></td>
</tr>
</tbody>
</table>
| Biological domain | Life support  
|               |   Recreational  
|               |   Aesthetic  
|               |   Evolutionary  
| Cultural domain | Economic  
|               |   Recreational  
|               |   Aesthetic  
|               |   Scientific  
|               |   Evolutionary  
|               |   Symbolic  
|               |   Religious |

Below the life domain are the biological and the cultural domains. These domains address the research question of “Sustainability of what?”, and therefore the identification and descriptions of values behind biodiversity that might be of interest for moral stakeholders.

The biological domain contains values behind biodiversity of importance for the biological flourishing. This means basically the roles of different ecological entities in delivering goods and services that support biological survival, growth and reproduction. As I commented to Rolston’s description of the life support value type, this might in the widest context also be seen to apply to supra-individual ecological entities. The values behind biodiversity, which I find relevant to consider for the biological domain, are primarily the life support, but also the recreation, aesthetic and evolutionary value types.

The reason for having the life support value type as a part of the biological domain should be easy to understand, since this is about such as nutrition, oxygen and water, which are all necessary for biological survival, growth and reproduction. It is especially the food supply part of this which the present investigation will focus on.
The recreational, aesthetic and evolutionary value types are marked in italics in mind photo 3.5, because, though I find it worthwhile to address them in the wider scope of the biological domain, they are not central to the present investigation. The reason why I address the recreational value type as a part of the biological domain is that rest and relaxation are necessary for the biological survival, growth and reproduction of many ecological entities. Sleeping might be seen as the most extreme and absolutely necessary form of recreation, both for humans and a number of animals. For the aesthetic value type I think of the mating and propagation processes where aesthetics in different forms seems to play a role. Lastly it might be said that the evolutionary value type is part of the biological domain because DNA and RNA are important sources for successful biological survival, growth and reproduction.

While leaving the biological domain with the life support value type only in the flourishing matrix of the present investigation, the cultural domain will contain all the value types listed in mind photo 3.5. These are the economic, recreational, aesthetic, scientific, evolutionary, symbolic and religious value types. Perhaps except for the evolutionary value type, it should be relatively obvious that the other value types have cultural traits. The economic value type is perceived to be cultural because it links values behind biodiversity to the human-made economic and monetary systems. The recreational and aesthetic values are cultural in the sense that they represent typical human desires such as the pleasure of the outdoors, the adventure of game hunting and fishing, the enjoyment of wildlife, and the fascination of the beauty of scenic landscapes, animals and plants. The scientific value type is plainly cultural because it is about reason and knowledge. Almost just as obvious, the symbolic and religious value types are cultural because they are about cultural identity and spiritual kinds of things. Then, finally, is the question of why the evolutionary value type is part of the cultural domain. This refers to such as the awareness of humans’ dependency on nature and the need in this sense to care for the evolutionary processes both for current and future generations. The evolutionary value type actually contains many of the issues addressed in the present investigation, and links specifically to Chapter 4 (Sustainability Context – contemporary perceptions).

**Flourishing matrix – final**

Mind photo 3.6 shows the final version of the flourishing matrix, as it stands in the conceptual model. Added here is a column for descriptions of values behind biodiversity in relation to the relevant value type. This is meant to provide key words and terms that describe how moral
stakeholders perceive values behind specific ecological entities. The ecological entities
described are stated in the column to the right. Noted also is that the heading of the flourishing
matrix should address which values behind biodiversity the different moral stakeholders are
specifically concerned about.

**Mind photo 3.6  Flourishing matrix – final**

<table>
<thead>
<tr>
<th>Types</th>
<th>Descriptions</th>
<th>Ecological entities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life values</td>
<td>Key words and terms describing how moral stakeholders perceive values behind specific ecological entities</td>
<td>Stating which ecological entities the descriptions are about</td>
</tr>
<tr>
<td><strong>Biological domain</strong></td>
<td>Life support values</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural domain</strong></td>
<td>Economic values, Recreational values, Aesthetic values, Scientific values, Evolutionary values, Symbolic values, Religious values</td>
<td></td>
</tr>
</tbody>
</table>

The practical use of the flourishing matrix will be explained in subchapter 3.3, which contains the methodical description of the case study.

**3.2.2 Inner worth table – universal, particular or purely instrumental**

Continuing with the inner worth table, it should be recalled that the methodological structure described here represent the basis for the development of the table in Chapter 5 (Conceptual model – a primary goal). This is therefore to be regarded as a schematic sketch, and not a final outcome as for the flourishing matrix.

The primary intention of the inner worth table is, as mentioned, to handle the research question of “Sustainability for whom?” and thereby give input to the life value type of the flourishing matrix. This means to distinguish and clarify the premises for why and whether any ecological entities might qualify for a moral stakeholder status. In addition, the inner worth table will show how the different value types of the flourishing matrix relate to the life
value type and to each other. This is done in order to increase the awareness about what it is with the life value behind an ecological entity that specifically qualifies for moral stakeholder status and how this might be distinguished from other possible types of values behind the entity. A part of this will be to sort out interpretations of the sometimes unclear use of buzzwords, such as value in itself, intrinsic value, inherent value and worth, which were referred to in Chapter 1 (Introduction – research area).

**Inner worth – generic term**

I have selected inner worth as a generic term for referring to the variety of perceptions and notions used to describe instrumental and non-instrumental values of ecological entities. Inner worth covers therefore both instrumental terms, such as means to other ends, resources, goods, services and utility, and non-instrumental terms, such as intrinsic value, inherent value, end in itself and value in itself. I have defined three categories of inner worth. These are universal inner worth, particular inner worth and purely instrumental value. The universal inner worth refers to the life domain, while the particular inner worth and the purely instrumental value refer to the biological and cultural domains. Some might hold that ecological entities with purely instrumental value only cannot be described as having an inner worth. This might well be the case, and is not a big issue in relation to the inner worth table. The important thing, as will be explained in the following, is distinguishing between the three value categories.

**Three value categories – universal inner worth, particular inner worth, purely instrumental value**

The presentation of the three value categories starts with the universal inner worth, followed by the purely instrumental value. Lastly is the particular inner worth, which in the inner worth table is placed in between the other two value categories. The particular inner worth is special because it, as shown in mind photo 3.7, contains most of the value types of the flourishing matrix, and because the borderlines to the universal inner worth and the purely instrumental value are not always very clear.
Inner worth of ecological entities – development stage I

<table>
<thead>
<tr>
<th>Ecological entities with possible universal inner worth,</th>
<th>or no universal inner worth, but particular inner worth,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life domain</td>
<td>Cultural domain</td>
</tr>
<tr>
<td>Direct moral status values</td>
<td>Recreational values</td>
</tr>
<tr>
<td>that might qualify for</td>
<td>Aesthetic values</td>
</tr>
<tr>
<td>moral stakeholder status</td>
<td>Scientific values</td>
</tr>
<tr>
<td></td>
<td>Evolutionary values</td>
</tr>
<tr>
<td></td>
<td>Symbolic values</td>
</tr>
<tr>
<td></td>
<td>Religious values</td>
</tr>
<tr>
<td></td>
<td>Biological domain</td>
</tr>
<tr>
<td></td>
<td>Life support values</td>
</tr>
<tr>
<td></td>
<td>Cultural domain</td>
</tr>
<tr>
<td></td>
<td>Economic values</td>
</tr>
</tbody>
</table>

Universal inner worth:

The question of moral stakeholder status is linked to universal inner worth. This is in the sense that ecological entities which within the life domain are perceived to have life values as ends in themselves will be said to have a universal inner worth. Such entities may also qualify for a moral stakeholder status.

I have decided to use the term “direct moral status value” when referring to this life value. The term is understood the way Wetlesen (1996 p.63) describes it with reference to Regan and Taylor, and their use of the term “inherent value”. Wetlesen says that the term “inherent value” should be treated as referring to a moral status value which is ascribed to all or only those objects which are recognised to have a moral status. To have moral status Wetlesen (1999 p.289) describes as being an entity towards which moral agents have, or can have, moral duties. Moral agents are, Wetlesen (ibid. p.301-302) says, moral persons that are able to take a moral responsibility for his or her actions, and to be answerable for them. This requires not only the capabilities of free will, reason and a linguistic competence, he explains, but also the operative ability of realising these capabilities in practice.

The moral duties Wetlesen (ibid. p.289) refers to are direct duties which moral agents have to the entity itself, and not only indirect duties, which the moral agents have with regard to the
entity. An indirect duty means for instance, he explains, not to harm the property of a person. Moral status is therefore ascribed to the person and not to the property.

When adding the term value to moral status, Wetlesen (ibid. p.289) says, this can simply be understood as the value affirmed of entities towards which moral agents have direct moral duties, and denied to other entities. It is this kind of moral status value that in the present investigation is denoted as direct moral status value.

In summary, this means that ecological entities with life values as ends in themselves will be ascribed direct moral status values. Such ecological entities will, as shown in mind photo 3.7, have universal inner worth and they may qualify for moral stakeholder status. Decisions of whether ecological entities have a direct moral status value will be based on universally accepted value-conferring properties. The question of universal inner worth will therefore depend on such properties and not on statements about intrinsic value, inherent value, end in itself or value in itself alone. What value-conferring properties are about will be explained later.

Purely instrumental value:
Distinctly different from the universal inner worth value category are when values behind biodiversity are purely instrumental as means to other ends. These are such as when ecological entities are valued as necessary life support food to secure survival, growth and reproduction or as sources of economic income. In mind photo 3.7 this is shown by noting the life support values within the biological domain and the economic values within the cultural domain to be purely instrumental.

Particular inner worth:
The rest of the value types, spanning from the recreational and aesthetic via the scientific and evolutionary to the symbolic and religious values behind biodiversity, are more difficult to classify. On the one hand they might be perceived as not being purely instrumental valuation of ecological entities as means to other ends. On the other hand, it is difficult to see that they represent valuations of entities as ends in themselves of the universal inner worth value category. The kind of valuations applied here might be compared with the way works of art are valued. For some people a work of art might be perceived as having an inner worth, while others will see no value in it, unless perhaps for purely economic instrumental reasons. These
kinds of valuations within the cultural domain, which depend on how single humans or groups of humans subjectively appreciate, value or respect ecological entities, I have decided, as shown in mind photo 3.7, to describe as representing a particular inner worth. It is called particular because it represents valuations of ecological entities that are more subjectively personal or group-related than when ecological entities are said to have universal inner worth.

The idea of using the term particular inner worth as a value category for the recreational, aesthetic, scientific, evolutionary, symbolic and religious value types was derived from Myskja’s (2003 p.155) distinction between subjective and objective intrinsic value. The objective intrinsic value, as Myskja describes it, resembles my universal inner worth, while the subjective intrinsic value resembles the particular inner worth. Myskja says that the subjective intrinsic value only exists in a particular valuer and therefore does not exist without a valuer. He mentions examples such as a picture inherited from your grandparents, Lassie the dog, and the Buddha statues destroyed by the Taliban in Afghanistan. All these entities have subjective intrinsic value, he says, because some, but probably not all people, do appreciate them. Myskja (ibid. p.156) says that entities with objective intrinsic value have moral value even if no one exists to appreciate them. ‘There is something about the object making it valuable independent of evaluators’, he says. Personally I have difficulties seeing that an object can have value without a valuer, but leaving that question aside, I have sympathy for the thought that an object might have a value that goes beyond the subjective existence in a particular valuer. Although this kind of objective intrinsic value is not exactly what is meant by universal inner worth, it comes quite close to it. If ecological entities have universal inner worth, then they ideally have some value-conferring properties that both now and in the future should be accepted by the many as a basis for ascribing a direct moral status value. This means that universal inner worth at least has a kind of eternity dimension close to the objective intrinsic value. On the other hand it does not mean that universal inner worth necessarily applies forever without humans to appreciate it, but rather that it works independent of the idiosyncratic and particular variations and fluctuations in individual humans’ value perceptions. The latter point is why it can be said that universal inner worth has a kind of eternity dimension, and is thus less influenced by individual value perceptions.

Located some place between the purely instrumental and the universal inner worth value categories, the borders to the diverse particular inner worth value category can be rather blurred. As an example, the recreational and aesthetic values of nature might be associated
both with tourism income and with wildlife adventure. These represent then both a purely instrumental economic value and a cultural value of the particular inner worth value category. Another example is the spiritual and religious valuations of mountains or other ecological entities, and maybe also the aesthetic valuation of nature’s beauty, which might just as well be associated with the universal as with the particular inner worth value category.

Without arguing about it at this stage, I will state that the particular inner worth value category, which some might perceive to represent a non-instrumental value, will strictly speaking represent an instrumental value in the sense that it represents particular human perceptions linked with their own well-being. The rationale behind this statement will hopefully be clearer in the development of the conceptual model in Chapter 5 (Conceptual model – a primary goal).

In a real participatory process the parties might have perceptions of inner worth that are different from what I have concluded so far. The case might very well be that some of the parties will claim that all or some of the values within the cultural domain aspire to contain value-conferring properties for ascribing a direct moral status value and universal inner worth. I think here especially of the aesthetic, symbolic and religious value types. The perception of this might also change over time. If human cultures and societies move, as Norton (2003 p.34) describes it with reference to Henry David Thoreau, towards a higher, less materialistic and consumptive set of needs and style of life, then, I believe, some values behind biodiversity of the particular inner worth value category might shift to the universal.

Finally, before leaving this discussion of value categories, it should be recognised that entities with universal inner worth might also be valued to have particular inner worth and purely instrumental value. This should be understood the same way as when Kant says that we should act so as to use humanity ‘always at the same time as an end, never merely as means’ (Kant 1785 p.38). Using the same thinking on the value categories of the inner worth table, this might say that an ecological entity with universal inner worth should never be used merely as an entity with particular inner worth or purely instrumental value.

**Ecological entities with universal inner worth – possible value-conferring properties**

Having grouped the different value types in relation to each other, the next part of the inner worth table that needs to be described is how to identify possible universal inner worth of
ecological entities. This depends, as mentioned, on universally accepted value-conferring properties.

Value-conferring properties – as described by Wetlesen

Wetlesen (1996, p.3) says that moral status value is ascribed to moral subjects themselves on account of what they are. The underlying assumption, he says further, is that moral subjects have certain factual properties which are morally relevant as grounds for the ascription of moral status. When explaining what this is about, Wetlesen (1999 p.292) refers to casuistic argumentation and the use of paradigmatic examples. By paradigmatic examples Wetlesen means examples that all or most humans, or at least the parties involved in a discussion, can agree upon as a reference point. Analogical extensions to other cases can then be drawn from such paradigmatic examples. Wetlesen says further that if we start with paradigmatic cases of entities that are recognised to be moral subjects, we can attempt to find which of their factual properties are morally relevant as grounds for the ascription of moral status. These will be the properties which give the relevant similarities to other entities, and a basis for analogical extensions. Wetlesen (ibid. p.313) says that these kinds of factual properties represent normatively relevant similarities.

As a basis for his argumentation with regard to value-conferring properties, Wetlesen refers, as described in the following, to the Principle of Formal Equality and the participants involved.

The Principle of Formal Equality:
The Principle of Formal Equality can, according to Wetlesen (1999 p.291), be formulated to be that cases which are relevantly similar should be treated in a similar manner, and that a differential treatment requires a relevant difference. This means, Wetlesen says, that if we ascribed moral status to some entities and not to others, the first entity must have some relevant properties to the required degree, and the other entities must lack these properties or at least not have them to the degree required.

Participants involved:
On the basis of casuistic argumentation and the use of paradigmatic examples Wetlesen (ibid. p.297) recommends that a good place to start in a justification of moral status would be with the participants involved in a discussion of this status. In the context of the present
investigation this might be the human parties of a participatory process or members of an extended peer community. Wetlesen (ibid. p.297) adds that the prospects are good that the participants in a discussion of moral status may reach an agreement that all of them are ascribed moral status, and that they are ascribed an equal moral status value. This should mean that the prospects are also good that the moral status value the participants may agree on is of the direct kind. It should further be assumed, Wetlesen (ibid. p.298) says, that being a participant in the discussion of moral status is equivalent with being a moral agent. Since there are no limits to this class of participants in space or time, this implies, he says, a universalistic extension of moral status, including all potential participants living now or in the future. This should mean that at least all living and future generations of humans will have a direct moral status value that qualifies for moral stakeholder status. If it like this is assumed that human moral persons are taken as paradigmatic examples of entities which are ascribed moral status, then Wetlesen (ibid. p.313) concludes that it may be possible to extend this status to nonhumans on the basis of the normatively relevant similarities.

On the basis of the above I have found it reasonable to say that the human parties involved in the controversies between the Norwegian salmon farming industry and environmental interests should be regarded as moral agents and moral stakeholders with an equal direct moral status value. From this, it should be possible to discuss what value-conferring properties might be found for assessing whether direct moral status value might be extended also to ecological entities.

Value-conferring properties – basis for direct moral status value
Callicott (2002 p.5) addresses also value-conferring properties as grounds for claiming that persons are ends in themselves. He refers to the formulation of Kant’s categorical imperative, saying that humanity should always be treated as an end and never as a means only. This is justified, Callicott says, by claiming that each person has intrinsic value, and by finding in each person an intrinsic value-conferring property, which Kant identified as reason.

Based on the two references to Wetlesen and Callicott, I have decided to use the term “value-conferring property” to describe those factual properties that might be used to ascribe a direct moral status value to ecological entities.
Ecological entities – sort according to value-conferring properties

The development of the inner worth table will reveal that the different philosophical theories about environmental ethics referred to imply different kinds of value-conferring properties. These different value-conferring properties will in the inner worth table be grouped in separate columns, and the ecological entities will be sorted in accordance with the kinds of value-conferring properties they might have. This will schematically and logically be done as shown in the row labelled “Proposed value-conferring properties” in mind photo 3.8, and the columns associated with the different kinds of properties.

**Mind photo 3.8** Inner worth of ecological entities – development stage II

<table>
<thead>
<tr>
<th>Proposed value-conferring properties</th>
<th>Property I (including properties II and III)</th>
<th>Property II (including property III, but not property I)</th>
<th>Property III (but not properties I and II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological entities with universal inner worth, Life domain Direct moral status values that might qualify for moral stakeholder status</td>
<td>Ecological entities with properties I, II and III</td>
<td>Ecological entities with properties II and III</td>
<td>Ecological entities with property III</td>
</tr>
<tr>
<td>or no universal inner worth, but particular inner worth, Cultural domain Recreational values Aesthetic values Scientific values Evolutionary values Symbolic values Religious values</td>
<td>Ecological entities without property I</td>
<td>Ecological entities without properties I and II</td>
<td>Ecological entities without properties I, II and III</td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value, Biological domain Life support values Cultural domain Economic values</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

It is important to be aware that mind photo 3.8 just shows a provisional sketch of how an inner worth table may look like. Examples of ecological entities that will be considered as having none, one or more of the value-conferring properties identified during the development process in Chapter 5 (Conceptual model – a primary goal) are mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems.

When an ecological entity is identified as having one or more value-conferring properties, it will belong to one or more of the columns of the row containing the universal inner worth. The ecological entity will then have the value-conferring property of the column it is located
in as well as the properties listed in the columns to the right, but will lack the properties listed in the columns to the left. Ecological entities with property I will therefore also have properties II and III, while those with property III will be lacking both I and II.

**Inner worth of ecological entities – methodological structure**

In the finalised methodological structure of the inner worth table, as it now appears in mind photo 3.9, one row about possible degrees of direct moral status value and one row about ethical positions are added. This methodological structure for the inner worth table is then the basis or departure point for the further development of the inner worth table in Chapter 5 (Conceptual model – a primary goal). This will, as mentioned in Chapter 1 (Introduction – research area), be done on the basis of selected philosophical theories about environmental ethics.

**Mind photo 3.9 Inner worth of ecological entities – methodological structure**

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Position I</th>
<th>Position II</th>
<th>Position III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proposed value-conferring properties</strong></td>
<td><strong>Property I</strong> (including properties II and III)</td>
<td><strong>Property II</strong> (including property III, but not property I)</td>
<td><strong>Property III</strong> (but not properties I and II)</td>
</tr>
<tr>
<td>Possible degrees of direct moral status value</td>
<td>Equivalent with property I</td>
<td>Less than property I</td>
<td>Distinctly less than property I</td>
</tr>
<tr>
<td><strong>Ecological entities with possible universal inner worth, Life domain</strong></td>
<td>Ecological entities, such as mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems, with properties I, II and III</td>
<td>Ecological entities with properties II and III</td>
<td>Ecological entities with property III</td>
</tr>
<tr>
<td><strong>or no universal inner worth, but particular inner worth, Cultural domain</strong></td>
<td>Ecological entities without property I</td>
<td>Ecological entities without properties I and II</td>
<td>Ecological entities without properties I, II and III</td>
</tr>
<tr>
<td><strong>or no universal inner worth, purely instrumental value, Biological domain</strong></td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
</tbody>
</table>
Value degrees – *implications for moral stakeholder status*

The row labelled “Possible degrees of direct moral status value” is added because it is assumed that direct moral status value might be graded. A preliminary justification for making this assumption is based on Wetlesen’s elaborations about this. He (1999 p.314) holds, with reference to Regan, Taylor and Lombardi, that it is reasonable to assume that nonhuman living organisms can have a gradual moral status value. In short, Wetlesen can be interpreted to mean that the degree of direct moral status value of an organism is proportional to the degree of similarity it has to the value-conferring properties of a moral agent. The validity of this will be discussed during the development of the inner worth table in Chapter 5 (Conceptual model – *a primary goal*). This will also have implications for the assessments of whether ecological entities might qualify for a moral stakeholder status or not.

**Ethical positions – *based on direct moral status value***

Summing this up, the degree of direct moral status value ascribed to an ecological entity is decisive for whether the entity qualifies for a moral stakeholder status. The ethics that will be applied in relation to the universal inner worth of an ecological entity will therefore depend on its degree of direct moral status value. For the practical handling of this, I have decided, on the basis of these degrees, to group the ethics applied into ethical positions. This is why I in mind photo 3.9 have added the row labelled “Ethical positions”. At the present stage it might be useful to know that I have chosen three kinds of ethical positions for the judgements of ethical records in the case study. I label these positions, which are explained in Chapter 5 (Conceptual model – *a primary goal*), “traditional inter-human ethics”, “hedonistic nature-environmental ethics” and “proper nature-environmental ethics”. Hedonistic nature-environmental ethics focuses in short on the well-being of animals as long as they are alive and painless slaughtering, while proper nature-environmental ethics has similarities with what Rolston (1988 p.1-2) refers to as primary environmental ethics where nature has intrinsic value.

**Research questions – *some provisional remarks***

Already at this stage, some remarks can be given with regard to the reasonableness and relevance of my suggested answers to the research questions of the present investigation. This pertains particularly to the research question of “Sustainability of what?” and the research question about moral duties.
The reasonableness and relevance of my suggested answer to the research question of “Sustainability of what?” is demonstrated by the distinction between the biological and the cultural domains described for the flourishing matrix. I think here of my references in the suggested answer to biological kinds of values, such as food, water, shelter, comfort and economic income, and to cultural kinds of values, such as adventure, recreation and aesthetics. Further, the description of the flourishing matrix added with the description of the methodological structure of the inner worth table supports two other parts of my suggested answer. One is when I say that the biological kinds of values behind biodiversity are purely instrumental. The other is my belief that ecological entities’ needed and preferred values behind biodiversity are only of the biological kind.

With regard to the research question about moral duties I find that the rationale for using the direct moral status value as a basis for whether ecological entities might have a universal inner worth and qualify for a moral stakeholder status indicates the reasonableness and relevance of the first part of my suggested answer. This is when I say that if some or all ecological entities qualify for a moral stakeholder status, then humans will have direct moral duties towards them. Further, the distinction between direct and indirect moral duties supports the other part of the answer. Here I say that if ecological entities do not qualify for a moral stakeholder status then humans may have indirect moral duties towards them linked to humans’ needed and preferred values behind biodiversity. Also demonstrating how different perceptions about direct moral status value may create different perceptions with regard to moral duties is the mentioned split of philosophical theories into three ethical positions. This links to the research question of “Sustainability for whom?”.

3.3 The case study – salmon farming interests versus environmental interests

It should be recalled that the form of the case study is characterised as semi-narrative. I say that it is a kind of fiction with a charge against the Norwegian salmon farming industry, an examination, a judgement process with verdicts and some ethical goals. It is, however, not like in some free and entertaining fiction. It is stricter, with specific questions and with answers containing facts and values referred to in cited publications and reports. On the other
hand, it is not as strict and systematic as is normally expected when presenting empirical data. In short it might be said that the form is fictional, while the content is strictly empirical.

The charge is that the Norwegian salmon farming industry is threatening values behind biodiversity of interest for other moral stakeholders. The examination is about revealing perceptions with regard to moral stakeholder status and values behind biodiversity by asking questions related to the charge. The judgement process is about moral duties in the sense that it gives ethical records and verdicts according to the charge. Finally, some suggestions are made about ethical goals and possible measures for keeping account of progress and achievements in relation to these goals. The hope is, as mentioned, that this semi-narrative form will simulate and demonstrate how a real-life participatory process might be performed and what kinds of results might come out of it.

**Fact-related and value-related arguments – a narrative approach**

The case study is, as mentioned in Chapter 1 (Introduction – research area), arranged as a kind of hearing process based on the charge against the Norwegian salmon farming industry. The point is to reveal what arguments and value terms are used by the different parties. The examination is formalised nearly as a dialogue with questions and answers, but still within the format of a research process, and as such could be regarded as the fieldwork and gathering of data about fact-related and value-related arguments.

Without stretching the analogy too far, the idea of using a semi-narrative form is inspired by Galileo, when he, in his *Dialogue Concerning the Two Chief World Systems*, presented a full review of both sides of the argument precisely through a dialogue. Galileo’s case is basically about natural science, but it deals also with the mixture of facts and values. He faced the challenge of presenting new knowledge in an established cultural context of strong value-laden perceptions. Taking his cue from classical models, Galileo’s way of handling this challenge was to present the arguments of both sides through a dialogue. To what extent the dialogue as such can be seen as a precursor of post-normal science or participatory processes is difficult to say, but it at least allows different value perceptions to be heard. Since the present investigation is also about facts and values in a complex field, being inspired by Galileo’s dialogue form, this might be seen as a link to earlier traditions in science. In that sense, this could hopefully be accepted by natural scientists as a research approach that is useful also today. Adding that the post-normal science and participatory processes encourage
communication and dialogue, I concluded that the idea of using a semi-narrative form inspired by Galileo was a sensible choice for the case study.

For Galileo, unfortunately, the task was huge and the risks were high, having the prevalent dogmas as the law, and the Pope as the jury and judge for his case. The task of the present investigation is more modest and less dangerous, I hope, having to deal with biological science and the traditional and prevailing philosophical theories about environmental ethical positions as the “law”, and the salmon farming industry and environmental interests as the “jury and judge” of my findings and conclusions.

3.3.1 Examination and results – values behind biodiversity

The reader should be aware that since the examination is based on written material only, it has not been possible to have a real dialogue and pose control questions to clear up any misunderstandings with regard to my interpretations of the answers. Since I have both selected the relevant answers and interpreted them myself, the results and conclusions given on the basis of the examinations are thus fully my responsibility. Nonetheless, by using the most widely exposed and easiest available publications and reports about the issues addressed in the questions of the examination, I believe that some of the relevant value perceptions and arguments representing the parties’ main positions are picked up.

In a real-life participatory process it is crucial for the outcome of the process that control questions can be asked so that any misunderstandings can be avoided. For the present investigation, however, this is less important, since the focus here is on the process as such. In any case, to make the process as realistic as possible, efforts are be made to present the results in a way that could hopefully be perceived by all parties as familiar characteristics of the controversies. All the steps through the case study will be explained as carefully as possible to help the readers understand what is done and why.

Five interest groups are selected as parties to be examined in the case study. These are called the wild salmon group, the environmental group, the animal welfare group, the scientific group and the salmon farming group. The members of the five groups are presented in Chapter 6 (Examination and results – values behind biodiversity). The first four interest groups are referred to as the prosecutor groups in the sense that they are accusing the
Norwegian salmon farming industry of threatening values behind biodiversity. These are values which the prosecutor groups perceive as important for biological and cultural flourishing. The examination is, as mentioned in Chapter 2 (Research questions – values behind biodiversity and moral duties), restricted to values behind wild salmon, their habitats, commercial wild fish stocks\(^7\) and farmed salmon. The intention of the questions in the examination is to reveal how the different interest groups value these four ecological entities and in what ways they perceive that these values are threatened.

The charge – the essence of the controversies

The charge against the Norwegian salmon farming industry is formulated so as to limit the investigation, as decided in Chapter 2 (Research questions – values behind biodiversity and moral duties), to ethical questions related to reducing or avoiding negative impacts. This means that the charge focuses on negative impacts, which in the context of the case study means how salmon farming-related activities and agendas are threatening values behind biodiversity. In an effort to secure that the examination, on the basis of these limitations, gives relevant input to the discussion of the research questions, the charge is formulated as follows:

The Norwegian salmon farming industry is charged with violating ethical values by threatening values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon of importance for the flourishing of moral stakeholders. These moral stakeholders are humans, and might also be ecological entities.

This, which might be referred to as the main charge, is split into nine subcharges in the discussion. Each subcharge handles different kinds of threats to one or more of the values behind biodiversity referred to in the charge. The split into subcharges are done for the purpose of covering the widest possible range of ethical issues related to the charge.

The ethical values referred to in the charge are related to the Harm Principle, which is about the ethical value of non-malevolence, and the Equity Principle, which is about the ethical value of fairness and justice.

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\(^7\) It should be recalled that the term “commercial wild fish stocks” includes fish stocks for artisanal fisheries in developing countries.
Examination – data collection, fieldwork

On the basis of the charge against the salmon farming industry, six questions are asked to the interest groups. These questions are formulated to reveal what might be the prosecutor groups’ rationale behind the charge and what arguments that the Norwegian salmon farming industry may use to defend itself.

The examination takes as a premise that the different interest groups basically perceive their own activities and agendas to be ethically good unless explicitly admitting anything else. This means that the prosecutor groups’ answers will reflect what they perceive as environmentally friendly or good activities and agendas that might be judged to give a strong ethical record. This will be challenged by the salmon farming industry’s answers, which will reflect what they perceive as ethically good. Though the salmon farming industry may admit that some of their activities and agendas cause negative impacts on ecological entities, and also that they have a responsibility to reduce or avoid these negative impacts, they may still hold that their activities and agendas are ethically defensible within the Sustainability Context.

Long-term perspective – future generations

I expect that future generations will not be less diverse with regard to needs and preferences than the present one. Therefore, I believe it is reasonable to hold that long-term considerations of needs and preferences of the present generation might be just as good an indicator as any other when predicting future generations’ needs and preferences. I presume that the answers given in the examination could be seen as indicating the long-term perspectives of each interest group, and as such represent a kind of sample of what the interests of future generations might be.

Examination – six questions

Six questions are asked in the examination. The first two questions, as well as the last one, are asked to reveal how the interest groups perceive the values behind the four ecological entities. The three other questions are about threats to these values. In the following each of the six questions are presented with a short description.

The first two questions focus on the values behind wild salmon, their habitats and commercial wild fish stock.
To establish which of the three ecological entities (wild salmon, their habitats and commercial wild fish stocks) the interest groups are concerned about with regard to the values behind them, in order to determine the heading of the flourishing matrix, the following question is asked:

1) What are your primary interests in relation to ecological entities?

To describe the values behind biodiversity which the different interest groups specifically are concerned about, the following question is asked:

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

The next three questions are about threats to the values behind all the four ecological entities (wild salmon, their habitats, commercial wild fish stock and farmed salmon).

To reveal possible threats from salmon farming as seen from the perspective of the interest groups, the following question is asked:

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

To reveal the possibilities of handling the threats as seen from the perspective of the interest groups, the following question is asked:

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

To reveal possible threats from other activities and agendas as seen from the perspective of the interest groups, the following question is asked:

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

The last question focuses on the values behind farmed salmon.

To reveal possible positive values behind farmed salmon as seen from the perspective of the interest groups, the following question is asked:
6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

Results – flourishing matrix and threats

A summary of the answers given to the first two and the last question is presented in the flourishing matrix. As shown in mind photo 3.10, the answers given to question 1 are used to identify the values behind biodiversity which the moral stakeholders, here represented by the interests groups, are concerned about. This means whether the interest groups primarily are concerned about the wild salmon, their habitats, commercial wild fish stocks or farmed salmon. The answers to questions 2 and 6 are used to find key words and terms describing how the interest groups perceive values behind the specific ecological entities. These are sorted in relation to different values types.

Mind photo 3.10 Flourishing matrix – case study

<table>
<thead>
<tr>
<th>Values behind biodiversity</th>
<th>Types</th>
<th>Descriptions</th>
<th>Ecological entities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Life domain</td>
<td>Key words and terms describing how moral stakeholders perceive values behind specific ecological entities based on the answers given to questions 2 and 6</td>
<td>Stating which ecological entities the descriptions are about</td>
</tr>
<tr>
<td>Life values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological domain</td>
<td>Necessary life support food sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td>Purely instrumental economic values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recreational values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aesthetic values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scientific values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evolutionary values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Symbolic values</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religious values</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that I, due to the focus in the present investigation on salmon and commercial wild fish stocks, have changed the life support value type more specifically to read “necessary life support food sources”. I have also, due to the categorisation of the economic value type in the inner worth table as purely instrumental, noted this in the flourishing matrix to read “purely instrumental economic values”.

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Perceptions about threats are presented in a table constructed as shown in mind photo 3.11. This overview of threats is sorted into three groups. The first group is threats to wild salmon, their habitats, commercial wild fish stocks and farmed salmon caused by the salmon farming industry. This is based on the answers given to question 3. The second group is threats that the interest groups emphasise that the Norwegian salmon farming industry should handle, based on the answers given to question 4. The last group is threats to the four ecological entities caused by activities and agendas other than salmon farming, based on the answers given to question 5.

**Mind photo 3.11** Overview of threats to values behind biodiversity – *case study:*

<table>
<thead>
<tr>
<th>– threats to values behind biodiversity from the perspective of the interest groups</th>
<th>– threats to values behind biodiversity that the salmon farming industry potentially might be able to handle</th>
<th>– threats out of the control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
<td>Threats caused by other activities and agendas (question 5)</td>
</tr>
<tr>
<td>The prosecutor groups</td>
<td>The salmon farming group</td>
<td>The prosecutor groups</td>
</tr>
<tr>
<td>The salmon farming group</td>
<td>The salmon farming group</td>
<td>The salmon farming group</td>
</tr>
</tbody>
</table>

Threat 1
Threat 2
Threat 3
Cells are marked X if noted as a threat
Threat 4
Threat 5
Threat 6

When I present the results of the examination in a flourishing matrix and an overview of threats for each interest group, these are synopses of what I perceive as the main issues addressed by the interest groups as a whole. The results are meant to represent what I believe would be a kind of mutual understanding that the interest groups would agree upon if the examination had been real, and dialogue and control questions had been possible.

### 3.3.2 Discussion and conclusions – *judgements of ethical records and verdicts*

The discussion of the examination results is, as mentioned, structured more or less like a judgement process. The intention is that this shall demonstrate how it might be done in a real-life participatory process. This involves judgements of ethical records in relation to the ethical
positions identified by the inner worth table. These judgements are based on the results from the examination, presented, as described above, by the flourishing matrix and the overview of threats. The judgements of ethical records relate to impacts on values behind biodiversity caused by the salmon farming industry’s activities and agendas. The concluding remarks contain, it should be recalled, verdicts on the charge against the salmon farming industry, and also suggest future ethical goals and possible measures for keeping account of progress and achievements in relation to the goals. After the final conclusions I make the recommendations regarding some prioritised issues I believe are important for the Norwegian salmon farming industry to focus on when developing systems for ethical environmental accounting.

It is important to be aware that the judgements, the verdicts and the suggestions of ethical goals and possible measures for accounting all represent my subjective perceptions and opinions. This should more be seen as an input for further debate and development, than firm and settled conclusions from my side. The intention of the case study is, as mentioned, to describe the process and also to demonstrate possible outcomes from it. My practical recommendations should therefore be regarded as a demonstration of what might come out of a real-life participatory process. I think here of a real-life participatory process built on the methodological structure of the present case study where the whole salmon farming industry and its stakeholders should ideally be involved.
Part II: Theoretical basis – *premises and logic*

Part II begins with the review in Chapter 4 (Sustainability Context – contemporary perceptions) of discussions about sustainability. Then follows the development of the conceptual model in Chapter 5 (Conceptual model – a primary goal). It should be recalled that I denote the conceptual model as a primary goal because it is meant as a tool to help identify possible value grounds for ethical environmental accounting.
4. The Sustainability Context – *contemporary perceptions*

This chapter is, as mentioned, a review of discussions about sustainability. One reason for allocating a whole chapter to this, I say in Chapter 1 (Introduction – *research area*), is that the sustainability term is a widely accepted and frequently used term in discussions of biological conservation, environmental ethics and economic development. Another reason is that the concept of sustainability is accepted by many international leaders and influential organisations throughout the world as a way of reconciling potential conflicts between environmental protection and human development goals.

When discussing sustainability it has been customary to refer to the report *Our Common Future* prepared for the United Nations (UN) by the World Commission on Development and Development (WCED 1987) (Lemons and Brown 1995, Perman et al. 1999, Lee et al. 2000). The report states that ‘[s]ustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED 1987 p.43). This shows relatively clearly that sustainability is about ethical obligations to secure adequate life conditions, as the term itself intimates, in a long-term perspective. Apart from this, however, there is a great variety of possible understandings and thus no clear and unified definition or description of what sustainability in practice is about (Lemons and Brown 1995, Perman et al. 1999, Lee et al. 2000).

The Sustainability Context described in Chapter 3 (Method – *a post-normal science approach*) represents, as mentioned, my understanding of the contemporary perceptions about sustainability. The intention, I say further, is that the Sustainability Context should bolster the development of the conceptual model and frame the discussions in the case study. It should be recalled that the review in the present chapter of discussions about sustainability is done for the purpose of showing how the Sustainability Context is supported. The review is therefore not meant as a thorough and critical discussion of sustainability as such, but solely to reveal the connections or correlations between the Sustainability Context and contemporary perceptions about sustainability.
4.1.1 The Sustainability Context – culture, ecology, ethics

The main parts of the Sustainability Context are shown again in mind photo 4.1. These parts are, as described in Chapter 3 (Method – a post-normal science approach), the Cultural Element, the Ecological Element, the Ethical Element, the Harm Principle and the Equity Principle.

Mind photo 4.1 The Sustainability Context – main elements

The Cultural Element, it should be recalled, deals with the whole range of values behind biodiversity described in the flourishing matrix. This involves the two research questions of “Sustainability for whom?” and “Sustainability of what?”. It is on the basis of the answers given to these two research questions, I say, that the third research question about moral
duties is addressed. This is represented by the Ethical Element, which deals with moral duties in relation to impacts on moral stakeholders’ needed and preferred values behind biodiversity. Included here are the judgements of ethical records, followed by verdicts and some ethical goals. In between the Cultural Element and the Ecological Element are the Ecological Element, the Harm Principle and the Equity Principle.

The Ecological Element deals, I say, primarily with the need for awareness of the complexities of ecosystems and the uncertainties with regard to their processes. This represents a knowledge base that is necessary to take into consideration in the judgement process when deciding acceptable levels of impacts on ecosystems. This calls both for science to acquire more knowledge about ecosystem functioning and structure, and for the precautionary principle to be applied when deciding what risks to accept with regard to impacts on ecosystems.

The link between the Cultural Element and the Ecological Element is made, I explain in Chapter 3 (Method – a post-normal science approach), to demonstrate that it is necessary to be aware of and take into consideration the valuations of ecological entities when prioritising scientific efforts in improving the knowledge base. This is a knowledge base both of what we know and what we do not know about the complexities of ecosystems and the uncertainties with regard to their processes. Further, the link demonstrates that the precautionary principle should be applied in relation to what risks societies are willing to accept with regard to impacts on ecosystems and the sustainability of the values behind biodiversity.

The Harm Principle and the Equity Principle constitute, as denoted, the framework for the judgements of ethical records. In short this means that judgements of ethical records will be done on the basis of whether activities or agendas have impacts on ecological entities that can harm moral stakeholders or hamper equity with regard to the access to values behind biodiversity.

After this short recapitulation of how to read mind photo 4.1 and what I mean by the Sustainability Context and its elements, some introductory words are given before I start the review of discussions about sustainability. These are descriptions of the contents of the present chapter and some general comments to the sustainability term.
4.1.2 Contents of the sustainability chapter – four approaches, summary

Since the intention of this chapter is to see how the relevance of the Sustainability Context might be supported, I have found it useful to do this by reviewing approaches to the understanding of sustainability as this is described from the perspectives of the UN, economics, biology and philosophy. These approaches are chosen in an effort to cover different aspects of sustainability, and to provide a widest possible basis for evaluating the relevance of the Sustainability Context. The first two approaches may serve as general reviews of how sustainability is understood, while the last two are more specific, aiming at the two main topics of the present investigation, namely biology and ethics.

The first of the general reviews, the UN-related approaches to the understanding of sustainability, represents a relatively broad summary of what might be perceived as the dominating global perceptions of sustainability. This review covers more or less all the parts of the Sustainability Context and thus gives a basic status of its relevance, and not at least the conceptual traditions it is based on. It should be no surprise that my ideas of sustainability are broadly influenced by UN-related writings about the matter. The second of the general reviews, the economic approaches, shows the efforts and challenges in trying to adjust the monetary system to support sustainable development. Here the relevance of the substitutability part of the Equity Principle is specifically addressed. The review of the economic approaches is not meant to discuss whether economics as such is suitable to handle sustainability issues. It is more to demonstrate some adjustments that have been suggested in an effort to try to handle sustainability within the frames of economic mechanisms.

Next are the biological approaches, showing how biologists understand sustainability in relation to ecological processes. The focus is on the Ecological Element, but also the Cultural Element and the link between them. This review, more than the other reviews, addresses criticisms of sustainability and questions of whether it is at all possible on the basis of biological knowledge to talk about sustainability or sustainable environments. Then lastly, the philosophical approach is an example of how sustainability is understood from the perspective of a holistic and ecology-based environmental ethics. This handles particularly issues related to the Cultural Element and the framework for the discussion of ethical records.
Intermediate summaries are made under each approach. Building on these intermediate summaries, the last part of the review is a summary of how the four approaches support the relevance of the Sustainability Context.

**Sustainability term – frequently used, variety of definitions**

Before starting the review, some general comments to the sustainability term will be given. Brown and Lemons (1995 p.5) say that documents such as the WCED (1987) report and the reports from the UN Conference on Environment and Development, Rio de Janeiro 3 to 14 June 1992 (hereafter: UNCED) leave most questions about the meaning of sustainable development unresolved. Perman et al. (1999 p.51) say that no universally agreed definition of the concept of sustainability has been established, and that a vast array of definitions, meanings and interpretations of the concept can be found in the literature. Pezzy (1997 p.448) illustrates this situation by saying that he sees little point in expanding the collection of sustainability definitions to the five thousand definitions which he states that one readily can find in the literature.

If it is right that the UN reports leave most questions about the meaning of sustainable development unresolved, and that it in general is almost impossible to find a universally agreed definition of the concept of sustainability, then any review of discussions related to sustainability might seem hopeless. Brown and Lemons (1995 p.5) state, however, that most analysts, despite the unresolved sustainability questions, view it as a significant attempt to develop principles to guide future actions. Since, therefore, the scope of the present investigation is more or less about future actions in the sense of establishing ethical goals and developing ethical environmental accounting systems, it should be worthwhile to look into a variety of interpretations of sustainability and see how they might support the Sustainability Context.

### 4.2 UN-related approaches – general view on sustainability

The review of the UN-related approaches to the understanding of sustainability is divided into seven sections. The first six sections discuss consecutively the relevance of the different elements of the Sustainability Context shown in mind photo 4.1. The first section discusses the relevance of the Cultural Element, and thus of having cultural issues as part of the
Sustainability Context. The next section discusses the content of the Cultural Element. This involves the two research questions addressing “Sustainability for whom?” and “Sustainability of what?”. The third section discusses the content of the Ecological Element, which involves questions of ecosystem complexity and uncertainty. Linked to the Ecological Element, the fourth section discusses the role of science and the precautionary principle. The fifth and sixth sections handle the ethical framework for the judgements of ethical records, which is the basis for the Ethical Element. First is the Harm Principle, which is about avoiding that moral stakeholders are harmed by ecosystem goods and services of inferior quality. This means to secure the quality of values behind biodiversity. Second is the Equity Principle, which is about fair distribution of and access to values behind biodiversity, including the use of acceptable substitutes. The seventh section presents the intermediate summary, summing up how the references and analyses reviewed relate to the Sustainability Context described in mind photo 4.1.

This review of the UN-related approaches is primarily based on references and analyses found in UN reports and two textbooks related to these. The UN reports are Our Common Future (WCED 1987), and the Rio Declaration on Environment and Development (hereafter: Rio Declaration) (1992) and Agenda 21 (1992) from the UNCED. The two textbooks are Sustainable Development: Science, Ethics, and Public Policy (Lemons and Brown 1995) and Global Sustainable Development in the Twenty-First Century (Lee et al. 2000). For the review of the role of science, the precautionary principle and substitutability, references and analyses are added from the NENT\(^8\) (2003) report The precautionary principle: between research and politics and the book Fair principles for Sustainable Development (Dommen 1993).

It should be recalled that this review, in addition to giving a basic status of the relevance of the Sustainability Context and the conceptual traditions it is based on, also gives, as I see it, what might be the dominating global perceptions of sustainability.

\(^8\) The National Committee for Research Ethics in Science and Technology, Norway (Den nasjonale forskningsetiske komité for naturvitenskap og teknologi).
4.2.1 Relevance of the Cultural Element – *economics and social issues*

Brown and Lemons (1995 p.5) ask whether the concept of sustainable development, in addition to being about people and nature, is also about cultures, communities and ways of life. Translated to the present investigation, this means whether, in addition to the Ecological Element, also the Cultural Element should be a part of the Sustainability Context. Brown and Lemons (ibid. p.4) refer to Gowdy (*Progress and Environmental Sustainability*, 1994), who seems to support the perception that sustainability should in addition to environmental protection also be associated with the long-term perspective of humans’ economic and social welfare.

There seems, however, to be diverging opinions to whether the WCED and the UNCED clearly include culture in the sustainability concept. In search of any prescriptive rule about whether the concept of sustainable development is also about cultures, communities and ways of life, Brown and Lemons (1995 p.5) say that they find this neither in the WCED report nor in the Rio Declaration and Agenda 21. This is despite, they say, that the Rio Declaration and Agenda 21 could be seen as provisions of how the concept of sustainable development should be understood. Lemons and Morgan (1995 p.79), however, have found that Agenda 21 recognises that biodiversity should be conserved to meet social, economic and environmental sustainability goals. Further, Principle 22 in the Rio Declaration (1992) seems to be in line with this way of thinking when it proclaims that the identity, culture and interests of local communities should be recognised, and their participation in the achievement of sustainable development should be enabled.

In a synthesis of what the concept of sustainability should contain, Lemons and Morgan say that:

> For all of the different resource users, concepts of ecological sustainability need to be used to define acceptable impacts of resource use on biodiversity, while concepts of social and economic sustainability must be used to define acceptable measures to obtain equitable improvements in social and economic well-being. (Lemons and Morgan 1995 p.82)

So, despite some ambiguity about whether or to what extent WCED and the UNCED include culture in the sustainability concept, Lemons and Morgan at least conclude that it should be. By their references to concepts of ecological sustainability and concepts of social and
economic sustainability I perceive this to be support for the idea that the Cultural Element together with the Ecological Element should be part of the Sustainability Context. The focus on values for flourishing in the Cultural Element has similarities with Lemons and Morgan’s concepts of social and economic sustainability, which focus on measures to obtain well-being. Further, the awareness about ecosystem complexities and uncertainties of the Ecological Element has similarities with the addressed need to define acceptable impacts on biodiversity in Lemons and Morgan’s concept of ecological sustainability.

Also McNeill (2000 p.16-17) describes ecology, economy and social issues as disciplines that are central to the study of sustainable development. He explains that the economic objectives are such as growth, equity, and efficiency, the social objectives are such as empowerment, participation, social mobility, social cohesion and institutional development, and the ecological objectives such as ecosystem integrity, carrying capacity, biodiversity and global issues. What is confusing in relation to this, he adds, is when the term sustainability is used in relation to all three objectives. McNeill believes that the best is to reserve the term sustainability to relate to concern for the environment, leaving the economic and social aspects as two other dimensions which are explicitly identified. Ideally all three objectives should be taken into account as a unified whole, although they should be conceptually separable, he says.

McNeill might therefore agree that it is relevant to include also the Cultural Element in the Sustainability Context, although he would associate sustainability primarily with the Ecological Element. Based on this and the other references above, I find it reasonable to conclude that including the Cultural Element together with the Ecological Element as parts of the Sustainability Context seems to be supported by the UN-related approaches.

4.2.2 Content of the Cultural Element – “Sustainability for whom?” and “Sustainability of what?”

Since the Cultural Element includes the two research questions of “Sustainability for whom?” and “Sustainability of what?”, the present section is a review of how these questions are handled in the UN-related approaches. This means both to what extent these questions are addressed and how they are answered.
“Sustainability for whom?” – moral stakeholders

Starting with the research question of “Sustainability for whom?”, this concerns the possible moral stakeholder status of ecological entities. One of the basic questions Brown and Lemons (1995 p.5) ask in this connection is if the concept of sustainable development requires humans to preserve all species of animals and plants. Connected to this they (ibid. p.5) say that Agenda 21 can be understood to express the urgent challenge of developing an ethic that will recognise the duties that people have to care for not only other humans, but also for other forms of life with which we share this planet. They say further that the purpose of Agenda 21 is to transform human life on earth so as to make it harmonious with nonhuman life. When Principle 7 in the Rio Declaration (1992) proclaims that ‘States should cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem’, the notion of integrity might be interpreted to point towards the possibility that some ecological entities have value as ends in themselves. Brown (1995 p.48) refers in this connection to Rolston (Environmental Protection and an Equitable International Order: Ethics After the Earth Summit, 1994), who says that the UNCED has added ‘the right to an environment with health and dignity’ to what he calls ‘the list of recognised universal rights’. Lemons and Morgan (1995 p.85) hold in this connection that management goals must include maintenance of viable populations of native species *in situ*, representation within protected areas of native ecosystem types, maintenance of evolutionary and ecological processes, and maintenance of evolutionary potentials.

But despite these references to care for nonhuman life, Agenda 21, according to Brown and Lemons (1995 p.4), has been criticised for having a too narrow anthropocentric approach. They hold that Agenda 21’s philosophical underpinnings fail to make preservation of the natural environment valuable in and of itself, for reasons that transcend human purposes or goals. They say further that there is little evidence in Agenda 21 that humans owe moral duties to the natural environment, to animals, plants, and ecosystems, and that these things may possess a value of their own independent of their usefulness to humans. Lemons and Brown conclude that only human beings are of ultimate concern in Agenda 21. As an example, this anthropocentric attitude is found in the first sentence of the preamble to Agenda 21, which says:
Humanity stands at a defining moment in history. We are confronted with perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. (Agenda 21 1992)

Regarding biodiversity, Lemons and Morgan (1995 p.101) hold that almost all of the language of Agenda 21 pertaining to sustainable development and conservation of biodiversity suggests that the reasons for conserving biodiversity are derived from the instrumental values and uses that biological resources provide humans. Lemons and Morgan (ibid. p.79), in their discussion of sustainability, seem to support this when they say that Agenda 21 addresses environmental goals in order to improve human welfare by protecting the sources of biological resources for human needs.

Also the Rio Declaration (1992) seems at the end to have a basically anthropocentric attitude when it in Principle 1 proclaims that ‘human beings are at the centre of concerns for sustainable development’, and that they are ‘entitled to a healthy and productive life’, though it adds that this should be done in harmony with nature. The anthropocentric attitude is also found in Principle 22 of the Rio Declaration (1992), when it, as already mentioned, proclaims that the identity, culture and interests of local communities should be recognised, and that their participation in the achievement of sustainable development should be enabled.

In an analysis of how the sustainable development debate has evolved, McNeill (2000 p.22) addresses the question of whether nonhumans have rights or not as a central question. He suggests ‘the rights of nonhumans as against humans’ as one of three central ethical and political issues of sustainable development. Similarly, Brown and Lemons (1995 p.9) say that the world is urgently challenged to develop an ethic that will recognise the duties that people have to care for other forms of life with which we share the planet.

By this it should be reasonable to conclude that since the question of whether ecological entities have values as ends in themselves is repeatedly addressed in the UN-related approaches, the research question of “Sustainability for whom?” should be considered to be relevant. The relevance of this is reinforced when there, despite that the question is addressed repeatedly, are no clear answers to whether any ecological entities should be regarded as having values as ends in themselves. Some have even called for a new environmental ethics
without explaining what this might be, or how it might be done (Brown and Lemons 1995 p.9).

This is why I found it necessary, as done in Chapter 5 (Conceptual model – a primary goal), to develop the conceptual model. The purpose is, as mentioned, to try to sort out whether, or to what extent, any ecological entities should be regarded as having values as ends in themselves. This means whether they might qualify for a moral stakeholder status.

“Sustainability of what?” – life support and cultural values
Continuing with the research question of “Sustainability of what?”, this concerns how humans value biodiversity as instruments that contribute to their biological and cultural flourishing. Agenda 21 (1992), through its 40 chapters, indirectly provides several examples of how ecological entities are valued by addressing the reasons for why sustainability and biological conservation are important and recommended. These reasons are linked to such as food, water and shelter, a number of economic activities based on natural resources such as mining, forestry, agriculture and fishing, and also amenity and recreation.

Lemons and Morgan (1995 p.77), in their discussion of reasons for why biodiversity is valued, similarly mention basic needs such as food, pharmaceuticals and fibre, and ecosystem services such as maintenance of atmospheric gases, climate control and nutrient cycling. They also mention values not related to consumptive resource uses, such as aesthetics and recreation. The challenge, they (ibid. p.85) say, is that the goals of sustainable development must take into account that there are conflicts over competing values. Linked to this they (ibid. p.79) emphasise, with reference to Agenda 21, that social goals should be set in order to reduce poverty and obtain a more equitable distribution of goods and social welfare, while economic goals should be set in order to maintain a natural resources capital for the benefit of future generations. Another author saying almost the same is Redclift (2000 p.101), who holds that high priority should be given to the immediate environmental problems associated with poverty, such as securing clean drinking water, sustainable farming systems and adequate shelter. Redclift (ibid. p.111) seems to agree that there are conflicts over competing values when he says that global environmental equity will require acknowledgement of the diversity in human culture.
As an example in this connection of how diverse the value perceptions might be, Lemons and Morgan (1995 p.102) refer to Rolston’s list of how humans value nature. This is the list I use as a basis in the flourishing matrix for grouping the values behind biodiversity, which means how ecological entities may contribute to biological and cultural flourishing. The list contains, as mentioned in Chapter 3 (Method – a post-normal science approach), values related to such as life support, economy, recreation, science, aesthetics, evolution, symbols, religion and life itself.

By this I understand the UN-related approaches to support the relevance also of the research question of “Sustainability of what?”. This is because they address the great variety of ways that ecological entities are valued. The notion that the variety of valuations causes conflict over competing values indicates further, as I see it, that it is relevant to search for ethical grounds for handling such conflicts. This is what the Cultural Element and the conceptual model are about. When at the same time poverty reduction and equity with regard to the distribution of resources are emphasised, this gives a hint towards the relevance of the Equity Principle as part of the framework for the discussion of ethical records.

4.2.3 Content of the Ecological Element – complexity and uncertainty of ecosystems

Linked to the Ecological Element Lemons and Brown (1995 p.11) hold that there is an obvious and urgent need to increase scientific understanding of which human actions cause environmental degradation. They (ibid. p.17) say that ‘decisions about environmental and sustainable development controversies often will have to be made in the face of pervasive scientific uncertainty’. They ascribe one source of this uncertainty to the ‘complexity and indeterminacy of ecosystems’. This recognition addresses quite precisely, I think, the relevance of having the awareness of ecosystem complexities and uncertainties, represented by the Ecological Element, as a necessary part of the Sustainability Context. By using the words of Lemons and Brown on the present investigation, this means that judgements of ethical records, in relation to the values behind biodiversity, will have to be made in the face of pervasive scientific uncertainty. When making these judgements, it is therefore necessary to recognise and be aware of the complexities of ecosystems and the uncertainties with regard to their processes.
Lemons and Brown (ibid. p.17) ascribe another source of this uncertainty to the limitation of available analytical tools. With reference to Shrader-Frechette and McCoy (1993), Lemons and Brown hold that any analytical tools available, whether site-specific case studies, statistical or mechanistic models, comparative studies, theoretical approaches or historical studies, all have limited capabilities to yield reasonably certain predictive knowledge for environmental problem solving. They (1995 p.19) assert further, with reference to Sagoff (Ethics, Ecology, and the Environment: Integrating Science and Law, 1988), that ecology has failed to develop predictive laws because ecological systems are so inherently complicated that all the small and assumed insignificant variables can easily overwhelm the system and confound mathematical models. Added to this, Lemons and Brown (1995 p.19) say, is the fact that we do not understand much about the structure and function of ecosystems.

In general, Lemons and Brown (ibid. p.18) contend, there are large uncertainties inherent in the assessment of ecological systems regardless of the scientific approaches or tools used. They explain that recent advances in chaos theory have called into question whether it is even possible to make long-term ecological predictions with any certainty. This indeterminacy of ecosystems, they (ibid. p.20) explain further, is why decision makers making environmental and sustainable development judgements often are faced with pervasive scientific uncertainty at all stages of problem identification, analysis and solving.

In Agenda 21 (1992) the complexities of ecosystems and the uncertainty with regard to their processes are addressed as challenges in relation to topics such as climate change, the atmosphere in general, and major ecosystems such as forests, mountains, aquatic environments and productive land areas.

In summary, I perceive the above references to support the relevance of having awareness of the complexities of ecosystems and the uncertainties with regard to their processes as the contents of the Ecological Element. On this basis I will briefly address the role of science and the precautionary principle as means to handle these complexities and uncertainties.
4.2.4 Role of science & precautionary principle – relation between facts and values

The role of science and the precautionary principle are in mind photo 4.1 presented as inputs to the Ecological Element based on the values behind biodiversity associated with the Cultural Element.

NENT (2003 p.11-12) says that the precautionary principle is the principle related to sustainable development that has greatest importance for scientific activity and methods. They also say that the precautionary principle relates risk to the knowledge situation. Principle 15 of the Rio Declaration describes this relation between science and the precautionary principle the following way:

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. (Rio Declaration 1992)

In a further elaboration of the role of science and the precautionary principle, the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST 2005), which is an advisory body to the United Nations Educational, Scientific and Cultural Organization (UNESCO), has suggested the following working definition of the precautionary principle:

When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. **Morally unacceptable harm** refers to harm to humans or the environment that is

- threatening to human life or health, or
- serious and effectively irreversible, or
- inequitable to present or future generations, or
- imposed without adequate consideration of the human rights of those affected.

(COMEST 2005 p.14)

In the comments to this definition it is said that scientific analysis should be ongoing so that chosen actions are subjected to review, and that the choice of actions should be the result of a participatory process (ibid. p.14).

Lemons and Brown (1995 p.11) maintain that Agenda 21 calls for an expanded role of science to promote sustainable development and environmental protection. Simultaneously, they say
further, there is a continuing debate about the role science should play in sustainable development decision making, due to the perceived limitations of the scientific methods and limitations with the predictive capability of science, as referred to in connection with the Ecological Element. They (ibid. p.11) say that the debate is based on an acknowledged need to increase scientific research and involvement in sustainable development decision making. They describe two controversies in relation to the role of science. The first is about how decisions should be made in the face of scientific uncertainty and the role of science in dealing with this. The other is that the role of science is questioned when certain value-laden dimensions of scientific methods and tools are considered.

With NENT’s and COMEST’s descriptions of the precautionary principle and the debate about the role of science as a starting point, the following three subsections describe in more detail the relevance of addressing the role of science and the precautionary principle in the link between the Cultural Element and the Ecological Element, as shown in mind photo 4.1. The first and the second subsection contain some reflections on the first controversy mentioned by Lemons and Brown, with the first one focusing on the relation between facts and uncertainty, while the second one focuses on the relation between value and uncertainty. The third paragraph discusses the second controversy relating to certain value-laden dimensions of science.

Knowledge – facts and uncertainties
With regard to the facts and uncertainty part of the controversy about the role of science, mind photo 4.1 indicates that science should produce knowledge about ecosystems. Agenda 21 supports this understanding of the role of science when it according to Lemons and Morgan (1995 p.85) calls for the development and use of the predictive capabilities of science in decision making. However, when Agenda 21 at the same time also recommends adoption of the precautionary principle, it is accused of being ambivalent (ibid. p.85-86). Lemons and Brown, Shrader-Frechette and McCoy and Sagoff are, as mentioned in connection with the Ecological Element, sceptical to the predictive capabilities of the science of ecology and conservation biology. In relation to this, NENT (2003 p.12) contends that it is important not to have unrealistic expectations. They refer here to non-risk societies as an illusion, which neither at the present nor earlier has had any real foundation.
On the other hand, despite all the uncertainties described, Lemons and Brown (1995 p.11) maintain that scientists have made important contributions to the understanding of serious environmental problems, such as the destruction of the ozone layer. Nonetheless, they continue, although causes and effects of some environmental problems are understood well, others are not. The climate change caused by greenhouse gases is mentioned as an example of a research field where causes and effects are not very well understood. Lemons and Brown’s conclusion is, as mentioned, that there is an obvious and urgent need to increase scientific understanding of which human actions cause environmental degradation. There is also a need, they add, to increase scientific understanding of how humans can proceed with development programs without causing further environmental damage. This understanding of the role of science is in line with Principle 9 of the Rio Declaration (1992) when it proclaims a need of strengthening the ‘endogenous capacity-building for sustainable development by improving scientific understanding’.

By this it might be concluded that science, despite the lack of predictive capabilities, has a continuous role to increase knowledge about ecosystems and their processes. This means knowledge about both what we know and what we do not know. Ecological knowledge useful for avoiding harm to moral stakeholders, as addressed by NENT’s and COMEST’s definitions of the precautionary principle, should have priority. I think then specifically of securing the quality of values behind biodiversity which represent ecosystem goods and services of importance for survival, growth and reproduction. At the same time, the recognition that there are limits with regard to the available knowledge points towards the relevance of having the precautionary principle as well as an input to the Ecological Element of the Sustainability Context.

If, on this basis Agenda 21’s call for the development and use of the predictive capabilities of science could be interpreted to be an appeal for more applicable knowledge, then this parallel with its recommended adoption of the precautionary principle might not necessarily be regarded as ambivalence. Instead it might be regarded as a strong support of the relevance of associating both the role of science and the precautionary principle with the Ecological Element.
Knowledge – values and uncertainties

This subsection presents some reflections on the value and uncertainty part of the controversy about the role of science. The focus is on how values associated with the Cultural Element influence perceptions about ecosystem complexity and uncertainty in the Ecological Element. This pertains to how valuations of ecological entities are decisive for the prioritising of scientific efforts and for the risk assessments and precautions taken in relation to ecosystems.

As mentioned above, NENT (2003 p.12) maintains that it is important not to have unrealistic expectations with regard to scientific knowledge and that non-risk societies is an illusion. In addition to the relation between risk and knowledge, they say that the precautionary principle gives direction and guidance as to the handling of technological and industrial development, integrates socio-economic aspects and suggests how to balance between different types of risk.

When Lemons and Brown (1995 p.17), as mentioned, ascribe the ‘limitation of available analytical tools’ and the ‘complexity and indeterminacy of ecosystems’ as sources to the scientific uncertainty in relation to sustainability, they also add the ‘need to make value judgements at all stages of problem identification, analysis, and solution implementation’ (ibid. p.17). Related to this they (ibid. p.18) say that when people have to decide which ecosystem parameters are more important to base judgements on, such decisions are often made with little or no empirical information available. Lemons and Brown (ibid. p.23) say further that the selection of indicators of sustainability, and the manner and extent in which they are synthesised, is based on human judgement as opposed to objective criteria. Together all this refers to the need of clarifying the value base, such as in the Cultural Element, when handling sustainability issues.

Brown (1995 p.40) says in relation to this that facts alone cannot be used to deduce an ethical conclusion. Some ethical premises are necessary. However, he continues, when a goal is chosen, science is extremely important in most environmental ethical discussions, because science can help evaluate the various means that are available to achieve the goal. Another reference addressing how scientific goals might be settled is when Lemons and Brown (ibid. p.15) refer to the post-normal science approach as a way of handling values in dispute. Similarly, NENT (2003 p.64-67) and COMEST (2005 p.46) point towards the post-normal science approach as a way of complying with the precautionary principle and of being able to
handle the mixture of scientific uncertainties and social values. Furthermore, Agenda 21 (1992) repeatedly addresses the need for participation in connection with the different sustainability goals and their value dimensions. This is referred to by terms like full participation of all parties, popular participation, participation of local communities, participation in decision making and participatory tools. Also Principle 7 and Principle 22 in the Rio Declaration (1992) point towards participatory processes. This is when Principle 7 proclaims that ‘States should cooperate in a spirit of global partnership’ and Principle 22 encourages the participation of local communities in the achievement of sustainable development.

The above seems to support the relevance of basing the role of science and the precautionary principle on the value perceptions of the Cultural Element. For the role of science, this is especially the case when Lemons and Brown say that people have to decide which ecosystem parameters are more important to base judgements on, and that the selection of indicators of sustainability is based on human judgement. This seems to mean that science needs to take into consideration the value grounds of the societies when producing and delivering biological knowledge. For the precautionary principle, NENT (2003 p.12), referring to socio-economic aspects specifically, seems to support the understanding that value perceptions, such as those associated with the Cultural Element, are decisive for what risks are to be taken. These are risks, as I perceive it, with regard to the possible harm to moral stakeholders caused by damage or the negative impacts on the quality of the values behind biodiversity.

All the references to post-normal science and participatory processes, along with the reference to a spirit of global partnership, also support the relevance of the methodological ground of the present investigation, as this is described in Chapter 3 (Method – *a post-normal science approach*). This also reaffirms the relevance of the Cultural Element as such, and its role as the value basis for the priorities of science and the use of the precautionary principle.

**Value-laden science – role as citizen and role as scientist**

Lastly in this review of the role of science and the precautionary principle is the second controversy mentioned by Lemons and Brown (1995 p.11), namely that the role of science is questioned when certain value-laden dimensions of scientific methods and tools are considered. Added to this they (ibid. p.35) say that difficult ethical questions often are inextricably embedded in scientific reasoning, because of the technical and practical need to
make untested value-laden assumptions and inferences. Because there sometimes are conflicts between their role as scientists, where they must refrain from speculation in the absence of scientific proof, and their role as citizens, which requires them to speak out in the face of perceived environmental threats, the scientists must decide what role to play in sustainable development controversies, Lemons and Brown (ibid. p.36) say. Linked to this they state that speaking out about perceived threats carries the risk of speculation, but it might also carry the advantage of promoting the precautionary principle. Since a person’s role as a scientist might therefore be confused with the role as a citizen, care should be exercised, Lemons and Brown assert, in identifying the value basis for statements and conclusions made.

Lemons and Brown (ibid. p.21) state further that unless the value-laden dimensions of scientific and technical studies are disclosed, the positions of decision makers will appear objective. Decisions will appear to be based on value-neutral scientific reasoning, when they in fact are partly based, Lemons and Brown conclude, on the often controversial and conflicting values of scientists and decision makers themselves. Added to this, Lemons and Brown (1995 p.18) say, are several other sources of subjectivity that also increase uncertainty and make sustainability judgements uncertain. One of those is that environmental science is much less predicative than many people realise.

Brown (1995 p.39) says in this connection that science is the discipline that attempts to make descriptive statements about the nature of reality through analysis of facts and experiences, and that this aims at value-free descriptions. But, he says further, scientific statements often contain hidden ethical positions because of uncertainty, burden of proof, decisions about resources to use, choice of disciplines and metaphysical assumptions about the nature of reality.

These reflections on the value-laden dimension of the science reaffirm again the relevance of the Cultural Element and the need to clarify values. This value-laden dimension of the science of biology is addressed further in the review of the biological approaches.

4.2.5 The Harm Principle – no-harm and quality

The relevance of the Harm Principle in the Sustainability Context is addressed in the abovementioned references about avoidance of impacts that might cause ecological entities to
be harmful to moral stakeholders. These are such as when NENT (2003 p.81) says that the precautionary principle should always be applied if damage to the environment and health may be practically irreversible, and COMEST (2005 p.14) says that harm which threatens human life and health is morally unacceptable.

As I understand the descriptions of the role of science and the precautionary principle in the section above, this is primarily about acquiring knowledge and taking necessary precautions to avoid harm and irreversible damage. Avoiding harm to moral stakeholders by securing the quality of the values behind biodiversity might then be seen as the core of or a prerequisite for sustainability. This is especially addressed by COMEST when they say that actions shall be taken to avoid or diminish harm to humans or the environment that is threatening to human life or health, or serious and effectively irreversible, or inequitable to present or future generations, or imposed without adequate consideration of the human rights of those affected. The issues mentioned here coincide with how I describe the Harm Principle.

In mind photo 4.1 this is indicated by the “no-harm” notion, which, as explained in Chapter 3 (Method – a post-normal science approach), refers to the kind of dichotomy with harm on one side and no-harm on the other. The “quality” notion refers to almost the same, it should be recalled, but is there to indicate that harm can be more polar with one negative and one positive condition, and a neutral condition in between.

4.2.6 The Equity Principle – fair distribution and substitutability

Lastly in this review of the Sustainability Context is the Equity Principle, which already has been mentioned in connection with the Cultural Element. This concerns the part of the ethical framework for the discussion of moral duties that covers fair distribution of and access to ecosystem goods and services, and the use of substitutes in this connection.

Fair distribution – present and future generations

COMEST (2005 p.14) defines, as mentioned, morally unacceptable harm as harm that is inequitable to present or future generations. NENT (2003 p.17) says in connection with the precautionary principle that risk must be within certain ethically acceptable limits, meaning that risk should be distributed equitably without reinforcing already existing dissimilarities in a society. The WCED report (1987 p.43) emphasises strongly the subject of equity and the
responsibility to care for the needs of both present and future generations, stating as
mentioned that ‘sustainable development is development that meets the needs of the present
without compromising the ability of future generations to meet their own needs’. The report
adds that sustainable development contains within it the following two key concepts:

- the concept of ‘needs’, in particular the essential needs of the world’s poor, to
  which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization
  on the environment’s ability to meet present and future needs. (WCED 1987 p.43)

When specifying some of the global challenges, the report mentions that the number of
hungry people is increasing and that the gap between rich and poor nations is widening.
Furthermore, with regard to environmental trends that threaten radically to alter the planet and
thus threaten the future lives of the human species, the report mentions such as the rapid loss
of productive dryland and forests, global warming, depletion of the protective ozone shield
and the introduction of toxic substances into both the human food chain and groundwater
(ibid. p.2-3).

In the Rio Declaration (1992) equity is addressed in Principle 3, which proclaims that ‘the
right to development must be fulfilled so as to equitably meet developmental and
environmental needs of present and future generations’. Linked to this is Principle 5, which
proclaims ‘the essential task of eradicating poverty as an indispensable requirement for
sustainable development’.

For the whole UNCED process in general, Brown (1995 p.48) refers again to Rolston
(Environmental Protection and an Equitable International Order: Ethics After the Earth
Summit, 1994), who in addition to the mentioned ‘right to an environment with health and
dignity’ adds the ‘right to an equitable international order’ to ‘the list of recognised universal
rights’. A similar concern for an equitable international order can be found in a number of
references. One is McNeill (2000 p.22), who says that the ‘rights of future generations as
against present generations’ and the ‘rights of the poor in the present generation as against
those of the rich’ should be two of the three prioritised ethical and political issues that he
refers to in his analysis of how the sustainable development debate has evolved. A similar
point of view is when Brown and Lemons (1995 p.9) contend that the world is urgently
challenged to develop an ethic that will recognise the duties that people have to care both for
other humans and for future generations. Other statements mentioned by Brown (1995 p.47) are that development can only be made sustainable when equity is the leading goal, and that the question of environmental protection remains inseparable from a need to create an equitable economic international order. Brown (ibid. p.49) goes far in the direction of linking sustainability with equity and poverty by stating that ‘no simple call for a sustainable living ethics is likely to be greatly influential until dire threats to survival are eliminated’. In the same spirit, Lemons and Morgan (1995 p.82) say that for sustainability to be achieved, the rights and interests of different user groups have to be defined. This, however, is problematic, they continue, since the 20 % of humanity which is the most impoverished often are accorded little or no role on decisions about resource use.

It should thereby be quite clear that equity questions are central in relation to sustainability. It should therefore be relevant to regard equity for present and future generations as a central part of the ethical framework for the discussion of moral duties in the present investigation.

**Substitutability – polluter pays principle**

Substitutability is, as mentioned in Chapter 3 (Method – *a post-normal science approach*), used as a term that should be understood as an extension of the polluter pays principle. This is explained to be in the sense that something might be used to compensate for the loss of something else, and even for situations where something is sacrificed for the purpose of achieving something else. A further elaboration of this will be given in the review of economic approaches, while the present section focuses primarily on the polluter pays principle.

The polluter pays principle is a relatively old principle in the context of the sustainability debate. It was adopted by OECD in 1972 as a fundamental principle for allocating the costs of pollution prevention and pollution control measures. The purpose was to induce the polluter to bear the expenses of preventing and controlling pollution (Dommen 1993 p.1). Linked to the polluter pays principle is a broader user pays principle, which essentially states that the price of a natural resource should reflect the full range of costs involved in using it (ibid. p.2). This should include the costs of the external effects associated with exploiting, transforming and using the resource, together with the costs of future uses that are foregone. Dommen (ibid. p.2) holds that the drafters of the polluter pays principle in the Rio Declaration (1992),
Principle 16, intended the text to cover the user pays principle as well as the polluter pays principle. Principle 16 proclaims the following:

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investments. (Rio Declaration 1992)

When decisions must be made regarding the practical application of the polluter pays principle, Dommen (1993 p.14) says that this must surely imply participatory political processes.

This provides the first indication of the relevance of using substitution, in the sense of substituting something with something else, as an acceptable ethical premise for the handling of situations where something has been harmed or eliminated. A further elaboration of this will, as mentioned, be given in the review of economic approaches.

4.2.7 Intermediate summary – UN-related approaches

The review of the UN-related approaches to the understanding of sustainability shows, as far as I perceive it, relatively broad support for the Sustainability Context.

Though McNeill holds that the sustainability term should primarily be reserved to relate to concern for the environment, there generally seems to be support for the view that the Cultural Element, in addition to the Ecological Element, is a relevant part of the Sustainability Context.

Since the question of values behind biodiversity is repeatedly addressed in the UN-related approaches, I find it reasonable to conclude that the research question of “Sustainability for whom?” is relevant. The great variety of values behind biodiversity mentioned entails that I also perceive the relevance of the research question of “Sustainability of what?” to be supported. All in all, the relevance of the content of the Cultural Element should thereby be established. The relevance of the content of the Ecological Element is supported by different
references to the complexities of ecosystems and the uncertainty with regard to their processes.

I find that Lemons and Morgan’s synthesis of the concept of sustainability, repeated below, is a good way of describing how the Cultural and the Ecological Elements relate to each other:

For all of the different resource users, concepts of ecological sustainability need to be used to define acceptable impacts of resource use on biodiversity, while concepts of social and economic sustainability must be used to define acceptable measures to obtain equitable improvements in social and economic well-being. (Lemons and Morgan 1995 p.82)

Lemons and Morgan’s synthesis might actually serve as a concise description of the Sustainability Context. The essence of this is that the Cultural Element concerns measures for achieving well-being, while the Ecological Element concerns the need to define acceptable impacts on biodiversity.

The UN-related approaches seem further to support the relevancy of associating both the role of science and the precautionary principle with the link between the Cultural Element and the Ecological Element. This entails support for the idea that the role of science, on the basis of perceptions of the value behind biodiversity, is to produce and deliver knowledge both of what we know and what we do not know of ecosystems and their processes. For the application of the precautionary principle, this entails support for the idea that acceptable risks also depend on how biodiversity is valued.

It should be added here that the role of science is debated both because it is value-laden and because there are limitations to its predictive capability. Because of the lack of predictability and thus uncertainty that pertains to ecology and conservation biology NENT says that it is important not to have unrealistic expectations. Despite this, however, it is maintained that scientists have made important contributions to the understanding of environmental problems. Therefore it might be concluded that science has a role continuously to increase our knowledge of what we know and do not know about ecosystems and their processes. On the other hand it is emphasised that science needs to take into consideration the value grounds of the societies when producing and delivering biological knowledge. In this connection it is said that scientific statements often contains hidden ethical positions, that environmental science is
much less predictive than many people realise and that there sometimes are conflicts between
the role as scientists and the role as citizens.

Then, finally, for the framework of the discussion of moral duties, both the Harm Principle
and the Equity Principle seem to be supported. The Harm Principle is addressed in NENT’s
and COMEST’s descriptions of the precautionary principle. This is such as when NENT says
that precautions should be taken where there are threats of serious or irreversible damage, and
COMEST says that harm which threatens human life and health is morally unacceptable. I
understand this to mean that avoiding harm to moral stakeholders by securing the quality of
values behind biodiversity is a prerequisite for sustainability. This might be such as securing
food safety by avoiding food poisoning due to contamination, or limiting extreme weather
conditions by reducing CO2 emissions and stopping the climate change.

For the Equity Principle, the strongest support in the reviews is for the relevance of the
fairness in distribution of and access to values behind biodiversity. The relevance of the
substitutability part of the Equity Principle is less obvious. A first indication of its relevance is
provided by the references to the polluter pays and the user pays principles. This will be
discussed further in the next subchapter.

Lastly it should be noted that the methodological ground of the present investigation is, as I
perceive it, supported by all the references to post-normal science and participatory processes.

4.3 Economic approaches – poverty, nature capital, value diversity

The review of the economic approaches is divided into two sections. The first section reviews
how the sustainability term relates to other terms used within economics, while the second
section presents six definitions or concepts of sustainability. Both sections will focus on how
the economic approaches referred to correspond with the Sustainability Context. As
mentioned, the intention is not to discuss whether economy as such is suitable to handle
sustainability issues, but rather to demonstrate some adjustments that have been suggested in
an effort to try to handle sustainability within the frames of economic mechanisms.
This review of economic approaches to the understanding of sustainability is based on the textbook *Natural Resources and Environmental Economics* (Perman et al. 1999)\(^9\). Therefore, only page numbers will be used when referring to Perman et al. (1999).

### 4.3.1 Sustainability – *posterity*

In their analysis of how economists think about sustainability, Perman et al. (p.50) find that the general notion of sustainability concerns the potential for some acceptable state of human well-being to be maintained over an indefinite period of time. This shows that the sustainability term in the economics context, just as mentioned for the UN-related approaches, is associated with ethical obligations to care for adequate life conditions in a long-term perspective. It is useful to recognise, Perman et al. (p.50) contend, that the arguments used in this connection are ethical and follow from a moral obligation which the present generation has to future generations. Such an obligation implies, they say further, that we do not to act in ways that jeopardise the chances of future generations to have the same opportunities as those that are currently enjoyed. ‘We are [therefore] led to the conclusion’, they (p.51) add, ‘that arguments of sustainability are intrinsically ethical in nature’.

This should support the relevance of having the Ethical Element with the adjacent Harm Principle and Equity Principle as parts of the Sustainability Context.

In reaching the conclusion that sustainable development entails that those people currently living have moral obligations to future generations, Perman et al. (p.1-2) describe three themes that are central in the discussion of natural resources and environmental economics. These three themes are efficiency, optimality and sustainability. Efficiency is mainly about not squandering opportunities by reducing or eliminating wastes, while optimality is about maximising the overall objective of a society. Efficiency is thus a necessary, but not a sufficient condition for optimality. The sustainability term, then, is described to be optimality added with the dimension of posterity. They hold in this connection that the pursuit of optimality, as usually considered in economics, will not necessarily take adequate care of posterity. Therefore, if taking care of posterity is seen as a moral obligation, then the pursuit of optimality will need to be constrained by a sustainable requirement, Perman et al. (p.1-2)

\(^9\) Perman et al. (1999) is an often used textbook for university studies in environmental economics.
conclude. Further, to explain this moral connection between sustainability and economic thinking, Perman et al. (p.12-13) first point out that economic growth since the 1950s and 1960s has generally been seen as the solution to the problem of poverty. However, they continue, since the world’s resource base is limited and contains a complex and interrelated set of ecosystems that are currently exhibiting signs of fragility, the economic growth strategy is increasingly questioned. Perman et al. call this the sustainability problem.

These reflections on environmental economics are interesting because they expose quite clearly that the dimension of posterity or long-term thinking is the essential part of sustainability. This is, as already mentioned, quite self-evident by the sustainability term itself. Nonetheless, what these reflections on economics show is that posterity is what essentially needs to be added to the traditional way of thinking in general. Both the Harm Principle and the Equity Principle have general application, and are actually not unique for the Sustainability Context. What is unique about the Sustainability Context is, as mentioned for the solution to the problem of poverty, that the care of posterity must also take into consideration the world’s limited resource base and the complexities of ecosystems. This shows that the Ecological Element should be regarded as both a highly relevant and an important part of the Sustainability Context.

### 4.3.2 Six concepts of sustainability – economic, biological and social focuses

Considering the great number of definitions of the concept of sustainability found in the literature, Perman et al. (p.51) believe it would be a fruitless task to try to distil a common essence from them. Instead Perman et al. present a way of classifying the major forms represented by six different definitions, or what they (p.52-64) call concepts of sustainability. They comment that these concepts are not all purely economic conceptualisations, meaning that they are not economic objectives per se. They also say that these concepts are not necessarily mutually exclusive, and that none of the concepts explicitly specifies the duration of time over which sustainability is to operate. The six concepts of sustainability are in the following grouped according to the kinds of focuses I think they represent in order to secure sustainability. These focuses are economic, biological and social.
Economic focus – future generations

The first concept (p.53-55) of sustainability primarily addresses the Equity Principle of the Sustainability Context, with focus on the access to natural resources for future generations. The concept says that a sustainable state is one in which utility or consumption is non-declining through time. This is a concept which according to Perman et al. represents the conventional way in which economists have defined sustainability. Sustainability is here viewed as a constraint on economical behaviour linked to the well-being of humans over time. This links to John Rawls’ work (*A Theory of Justice*, 1971), which according to Perman et al. (p.87) has had a remarkable influence upon the considerations given by economists to ethical issues. Perman et al. refer specifically to Rawls’ ‘veil of ignorance’, which is an imagined hypothetical state of affairs where individuals neither have any knowledge of their inherited characteristics, such as intelligence, race and gender, nor of their position in any agreed social structure. The purpose of this veil of ignorance, Perman et al. explain, is to guarantee impartiality and fairness.

In addition to the Equity Principle, the first concept also points towards the question of human flourishing and thus towards the relevance of the Cultural Element of the Sustainability Context. This is when Perman et al. (p.54-55) state that it is now widely agreed that the poverty line is culturally rather than biologically determined. By this they mean that consumption should not over time fall below some minimum, decent and culturally determined level. This, they say further, means that the poverty line is set at a level of access to resources considerably greater than what is required merely to reproduce a population over time. Following this concept, they conclude, sustainability can vary according to the culturally determined criterion used. This is an interesting notion that especially has implications for the judgement of equity.

Economic focus – substitutability I

The second concept (p.55-57) says that a sustainable state is one in which resources are managed so as to maintain production opportunities for the future. Perman et al. refer in this connection to Solow (On the intergenerational allocation of natural resources, 1986), who holds that it might make good sense to leave a smaller stock of non-renewable resources to future generations if that is compensated for by a more developed stock of scientific knowledge. A way of handling this, Perman et al. say, is to build on the generally accepted idea among most economists that production potentials at any time depend on productive
assets that to some degree are substitutable. In addition to raw human labour power, they
categorise these assets as natural capital, physical capital, human skill and intellectual capital.
The last three, which include things like production plants, equipment infrastructure, learned
skills and the state of technological knowledge, are often referred to as human-made capital.
This thus addresses the substitutability part of the Equity Principle.

The kinds of substitutions Perman et al. describe are of the type where the natural capital of
non-renewable resources is compensated for by rising quantities of human-made capital. They
comment that though this might work for non-renewable resources like energy and minerals,
it is hard to envisage any resources effectively substituting for the ecosystems and climate
maintenance functions of the natural capital. In this connection they (p.46) say that
biodiversity is important in the provision of environmental services to economic activity in a
number of ways. One way is as life support services facilitated by functions such as carbon
cycling, soil fertility maintenance, climate and watershed flows. Another way is as amenity
services of ecosystems facilitated by the diversity of flora and fauna, while a third is as
sources of many useful products, particularly for pharmaceuticals, foods, fibres and gene
materials for future biotechnology. But the greatest long-term importance is the evolutionary
potential afforded by biodiversity. Diverse gene pools represent a form of insurance against
ecological collapse.

These are all ways of valuing nature that correspond with the Rolston-based list in the
flourishing matrix of the present investigation. The important recognition is that not all values
behind biodiversity are substitutable. I think that Perman et al.’s notion here, that the greatest
long-term importance is the evolutionary potential afforded by biodiversity, is an important
recognition. This addresses a core issue linked to the Ecological Element of the Sustainability
Context.

**Economic focus – substitutability II**

Linked to the second concept is the third (p.57-60), which says that a sustainable state is one
in which the natural capital stock is non-declining through time. This concept is supported by
economists holding that substitutability is much lower than has been previously thought, and
that the degree of substitutability may fall when the natural capital stock depletes. The
problem with this concept, Perman et al. say, is that no fully satisfactory method yet exists for
valuing environmental resources, and that perhaps none could ever exist. This problem of
valuing environmental resources, combined with the comment in the second concept that substitutability is not envisaged in relation to ecosystems and ecological processes, touches upon both the complexity and uncertainty issues of the Ecological Element, the precautionary principle, and the question of how humans value nature in the Cultural Element.

Though there is a great number of unresolved questions about how or to what extent substitutability can be used as a mechanism in relation to the Equity Principle, the second and third concept referred to by Perman et al. after all supports the idea of including substitutability in the framework of the judgements of ethical records.

**Biological focus – the Ecological Element I**
The fourth concept (p.60-61) addresses specifically the relevance of the Ecological Element of the Sustainability Context. This is because the fourth concept focuses more on biological outcomes than the three others. It seems either to rely on some predictive capabilities of science of ecology or to depend on an active use of the precautionary principle. A sustainable state is said to be one in which resources are managed so as to maintain a sustainable yield of resource services. One interpretation of this concept, Perman et al. contend, is in the form of measures for maximum sustainable yield, which is often used in the management of renewable resources such as forests and fisheries. Their comment to this is that maximum sustainable yield may not necessarily be optimal with regard to conventional economic criteria. Another interpretation, they say, is the so-called ‘Spaceship Earth’ economy, which is described as economical and physical systems with perpetual reproducibility. This requires that a steady state be achieved in which the waste flows from production and consumption are equated with the systems’ recycling capacity.

**Biological focus – the Ecological Element II**
The fifth concept (p.61-63), like the fourth, is also oriented towards the biological outcome and linked to the Ecological Element. This is when it says that a sustainable state is one which satisfies minimum conditions of ecosystem stability and resilience through time. Perman et al. comment that a general functional limitation of this concept is that resilience, or change in resilience, is difficult to monitor or measure. But still, they add, some indicators may nonetheless be useful in order to avoid entering critical zones. For this concept as a whole, Perman et al. say that sustainability is about maintaining the integrity of the earth’s ecosystems in ways such as those described by Costanza et al:
Sustainability is a relationship between human economic systems and larger dynamic, but normally slower-changing ecological systems, in which 1) human life can continue indefinitely, 2) human individuals can flourish, and 3) human cultures can develop; but in which effects of human activities remain within bounds, so as not to destroy the diversity, complexity, and function of the ecological life support system. (Costanza et al. 1991 p.8-9)

This kind of concept of sustainability, Perman et al. say, views humans as just one part of the ecological system. Sustainability in this sense, they explain, is assessed in terms of the extent to which the structure and properties of prevailing ecosystems can be maintained. They assert, however, that such ecological views are often more human-centred than admitted. There is a presumption that the present system structure, including the important place in it occupied by humans, is preferred to other structures. As an example of this, Perman et al. mention the global warming issue, which would not cause the biosphere to cease to operate, but merely to operate in a different way. They guess that nearly all ecological scientists would take a stand against global warming, and most would do so on the ground that human life is more threatened in a changed ecosystem than in the present one. By this it seems that Perman et al. mean that scientists are motivated by a concern for humans and not for the biosphere as such.

The fifth concept, together with the fourth, touches upon most of the main parts of the Sustainability Context. The reference to Costanza et al. addresses the research question of “Sustainability for whom?” of the Cultural Element by the notion that human individuals should flourish and human cultures should develop. This is also addressed when Perman et al. say that ecological views often are more human-centred than admitted. Further, the complexity and uncertainty issues of the Ecological Element are mentioned by Costanza et al. in their notion of the diversity, complexity and function of the ecological life support system, and by Perman et al. in their comment that resilience is difficult to monitor or measure. The precautionary principle is addressed by the notion that effects of human activities should remain within bounds so as not to destroy the function of the ecological life support system. Finally, the Equity Principle, with reference to care for future generations, is touched upon by the notion that human life should continue indefinitely.

Social focus – participatory processes

The final concept (p.63-64) focuses on processes rather than outcomes and constraints. This seems to correspond with the ideas of post-normal science and participatory processes. This
concept sees sustainability as capacity and consensus building, in the sense that the people involved have reached consensus with regard to environmental as well as to social and political objectives. Consensus building should in this context be done through negotiations, Perman et al. maintain. Research should then be focused on the structure and management of such negotiations and on the supply of relevant information. Perman et al. explain that supporters of this concept hold that carrying capacities used within other concepts are unknown and probably also unknowable, and that values linked to such as cultural development, nature conservation and landscape planning cannot be priced and depend therefore on negotiations.

In summary, this last concept seems to support the relevance of the methodological ground and all parts of the Sustainability Context, and thus the relevance of the present investigation as such.

4.3.3 Intermediate summary – economic approaches

It is interesting to observe that the constraints proposed for modifying traditional economics have similarities with or actually seem to build on the UN-related notes about sustainability. This entails that the economic approaches to the understanding of sustainability also appear to support the relevance of the Sustainability Context and also the methodological ground of the present investigation. The core part of this is that the general basis for the sustainability term in the economics context, just as mentioned for the UN-related approaches, is associated with ethical obligations to care for adequate life conditions in a long-term perspective. Included in this is the need to take the world’s limited resource base and the complexities of ecosystems into consideration.

One particular outcome from this review of the economic approaches is the further elaboration of and support to the substitutability part of the Equity Principle. Though there is a great number of unresolved questions about how or to what extent substitutability can be used as a mechanism in relation to judgements of ethical records in the Sustainability Context, the review supports the idea of including substitutability as a part of this framework. Especially should be notified the recognition that some life support services, particularly the evolutionary potentials, are not substitutable

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4.4 Biological approaches – *ecological stability or chaos*

The main purpose of the review of the biological approaches is to see how biological science might support the relevance of the Ecology Element and the Cultural Element. This also involves the connection between them, represented by the role of science and the use of the precautionary principle. Some reflections on the relevance of sustainability as such, and the Sustainability Context in general, will also be given. It should be recalled, as mentioned a few times already, that the purpose of the Sustainability Context is to contribute with a way of analysing how to secure the sustainability of those values behind biodiversity that are important for the flourishing of moral stakeholders. This means the maintenance of ecological entities that are important for flourishing, whether it is biological or cultural flourishing. It should also be recalled that the review of biological approaches, more than the other reviews, addresses criticisms of sustainability and questions of whether it is at all possible on the basis of biological knowledge to talk about sustainability or sustainable environments.

On the other hand, though questioning whether sustainability is at all possible, the ideas or thinking in terms of sustainability might actually be said to stem from biology. What I think of here is Lotka and Volterra’s models for population growth, which involve equilibrium points in the relations between predators and prey (Krebs 2001 p.180-183, Molles 2002 p.310-311, 336). Such equilibrium points represent a qualification of ecosystems’ carrying capacity and thus, as I see it, a starting point for thinking in terms of sustainability at all.

While it is natural to think that biological science can contribute to an understanding of the relevance of the Ecological Element, this is less obvious in relation to the Cultural Element. However, since the value-laden dimension of science is mentioned in the review of the UN-related approaches, this and thus the relation to the Cultural Element will be included in the review of the biological approaches.

The review is divided into six sections. The first section is a historical review of ecological theories about stability and equilibrium. The second section is a review of how contemporary ecological science handles the stability issues. This is in the third section followed by some reflections on the special relation between stability and biodiversity. The fourth section reviews some perceptions on the possibility of predictability in the science of ecology. The fifth section is more value-related, and focuses on how valuations of ecological entities
influence or are influenced by the biological science, and addresses questions about value-laden science. The final section is the intermediate summary.


4.4.1 Historical review – stability and chaos

The intention of the historical review is to present some initial indications of how the Sustainability Context stands in the traditions of biological science.

The history of the science of ecology shows that ecosystems are in some occasions interpreted to be stable and relatively predictable entities, and in others to be unpredictable and chaotic (Jakobsen 2005). Starting with the interpretations of ecosystems as stable and relatively predictable entities, Jakobsen (ibid. p.61-62) refers to two Western traditions within the science of ecology. One he calls the arcadian tradition and the other he calls anti-arcadian. This refers to classical conceptions of the Greek region of Arcadia, often associated with pastoral tranquillity and also some kind of rustic paradise. The arcadian tradition is defined as having an organic and holistic perception of nature, while the anti-arcadian tradition, Jakobsen says, is motivated by a scientific approach, with the science of physics as the prototype.

The arcadian view – classic ecology

Jakobsen (2005 p.69) says that the arcadian view has roots back to the ancient philosophies, such as Aristotle’s ideas of a goal or telos for all changes, and his hierarchical levels in nature

\(^\text{10}\) Translated to English: Eco-philosophy – ecology, evolution theory and transformative learning.
where the higher elements have qualities that represent more than the sum of its lower elements. Jakobsen (ibid. p.61-62) refers specifically to Clements as an early representative of this tradition, and to Lovelock’s Gaia hypothesis and deep ecology as contemporary representatives of the arcadian tradition.

Jakobsen (ibid. p.61-63) refers to Clements’ approach as a dynamic ecology. Clements describes that there is a succession in the changes and development of the organic landscapes towards a stable state, and that this stable state is the ultimate purpose or goal of the changes. He refers to this ultimate goal as a super organism, where all individuals and species have reached a state of harmonious integration of an organised whole, Jakobsen says. The adjustments and coordinations that the super organism makes between the internal living and the external non-living elements of nature is what Clements calls the climax model or theory. Ecosystems are thus understood as organisms in development and change towards their mature and stable forms. Jakobsen (ibid. p.70) says that even though Clements’ ecological model has been criticised in modern ecology, his ideas are alive and renewed in such as Lovelock’s Gaia hypothesis, which states that there is an interaction between organisms and the inorganic world, including the atmosphere. According to Jakobsen (ibid. p.70), this is regulated by a program called Gaia, while Lovelock (2006 p.7) himself refers to the Gaia as ‘the great Earth system’. When Lovelock in his later writings about the Gaia hypothesis, however, talks about the revenge of Gaia in connection with climate change, it does not actually sound like this is about an arcadian kind of pastoral tranquillity or rustic paradise.

Though the arcadian view suggests that the ecosystems or the biosphere, whether called super organism or Gaia, are able to adjust and regulate themselves after changes, it is not thereby given, I believe, that the ultimate goal of the super organism or Gaia and the stable states reached will satisfy human needs and preferences. If the stable states should be unsatisfactory for humans, it would be necessary to learn how these changes work and to take the necessary precautions to secure human interests. In relation to the Sustainability Context, this points towards the relevance of the Ecological Element, with input from the role of science and the precautionary principle.

On the other hand, if the same stable states would always be reached after disturbances, then there might be less need to care about the Ecological Element. The super organism or Gaia would then, as Jakobsen characterises them, be stable and relatively predictable entities. The
role of science could then be to focus on predicting ecological processes, with less concern for the precautionary principle.

**The non-arcadian view — classic ecology**

Clements’ climax theory dominated the ecological thinking and education until after World War II, when it, according to Jakobsen (ibid. p.75), was replaced by more mechanical, physical and mathematical descriptions in ecology. This is what Jakobsen refers to as the anti-arcadian tradition and the scientific approach. He explains that terms such as energy exchange, energy cycles, energy flow and thermodynamics then appeared in ecology. Later representatives of this approach, which according to Jakobsen (ibid. p.62) is based on a Cartesian world view, are Lotka and Odum. Lotka announced a program, Jakobsen (ibid. p.75-76) explains, for an interpretation of ecosystems as physical machines, where the principles of thermodynamics were used to explain the processes that constitute the basis for biological systems. Inspired by Lotka’s physical approach to biology, Odum developed a mechanical-reductionistic ecosystem model (ibid. p.80). Based on physics and thermodynamics, Jakobsen (ibid. p.76) explains further, Odum defines his theory of ecosystems as a pure energy flow of nutrients. Odum believes, Jakobsen says, that nature consists of organisms that through mutual dependency and cooperation create ecosystems, and that in earlier stages the organisms may compete, but later they establish symbiotic relations, which end in stability or homeostasis. Odum’s homeostasis perspective seems to have similarities with Clements’ elements of stability and ultimate goal (ibid. p.77). The difference, Jakobsen (ibid. p.80) holds, is that Odum’s ecosystem model is mechanical and reductionistic while Clements’ model is organic and holistic.

Despite the similarities between Clements’ climax theory and Odum’s homeostasis perspective with regard to stability, Odum’s mechanical and reductionistic ecosystem model might imply that there are possibilities for a greater degree of predictability. This mechanical and reductionistic view should thus, even more strongly than the arcadian view, encourage and motivate scientific efforts in searching for knowledge about ecosystem processes. If the mechanical non-arcadian view should really represent the truth about ecosystem processes, then it should be possible for science to eliminate or drastically reduce the uncertainty part of the Ecological Element. The result might then be little need of the precautionary principle and less need of the awareness dimension of the Ecological Element.
The classical stability models, such as Odum’s homeostasis and Clements’ climax theory, have been challenged because the real world seldom appears or behaves in accordance with such ideal models, Jakobsen (ibid. p.86-87) says. He (ibid. p.94) says further that a new ecology has appeared that has abandoned the ideas of order and harmony in nature, and instead taken on board the ideas of chaos theory. This new ecology sees nature as open structures where non-expected and non-periodic incidents may influence the systems’ structures and functions, Jakobsen explains. The focus is more on nature as a process than on an ultimate goal where order is the end result. However, Jakobsen adds (ibid. p.102), it cannot be denied that some systems over a shorter or longer period might be stable in the classical sense. Jakobsen (ibid. p.101) refers to two strong advocates of the chaos theory, Pickett and White, who regretted already in the 1980s that many ecologists believed in homogeneous ecosystems when the real world is such that ‘virtually all naturally occurring and man disturbed ecosystems are mosaics of environmental conditions’. Proponents of the chaos ecology hold that it is due to the lack of harmony and order that ecosystems function, and that humans’ efforts to help ecosystems achieve stability produce the reverse of the desired effects, Jakobsen (ibid. p.105) says. This does not mean, he adds, that chaos ecologists believe that anything goes, because they still hold that there are limits to the human interference that nature can bear.

If the chaos theory is representative for ecosystem processes, the focus really needs to be on the precautionary principle and the Ecological Element. This implies that awareness of ecosystem complexity and uncertainty should be a highly relevant part of the Sustainability Context. Science might still have a role to produce as much scientific knowledge as possible. However, if chaos dominates to the extent that it renders most parts of ecosystem processes highly uncertain and almost unpredictable, it might be asked if sustainability and the Sustainability Context have any relevance at all.

Jakobsen (ibid. p.149) concludes that neither the new nor the classic ecology can be right alone. He believes that if the new ecology keeps some traits from the classic ecology, then this will strengthen the argument that ecology is an important science, in the sense that it can say something important about the biological world and how we should relate to it. Jakobsen lists four issues, which he sees as a framework for ecological science. The first is that life
fellowship comprises systems of organisms in dynamic interaction, which are functionally interrelated to each other. The second is that ecosystems can meaningfully be delimited through functional organisation, given by terms such as biodiversity, productivity, relative stability, distribution and consumption. The third is that the temporal scale is important. The fourth is that the complexity of natural systems is beyond our understanding or imagination, which entails that caution should be exercised.

I believe Jakobsen is right when he concludes that neither the new nor the classic ecology can be right alone, and that combining the new ecology with some traits from the classic ecology might be a good way of synthesising this. The most important consequence of this for the relevance of sustainability as such, and for the Sustainability Context, is that some degree of ecosystem stability is thereby recognised. Even the chaos theories admit this, as mentioned. In Jakobsen’s framework for the ecological science, it is specifically the first three issues about dynamic interactions, functional organisation and temporal stability that support the relevance of sustainability as such. This means that science should have a role in producing knowledge about these dynamic interactions, and that there should be some structures and systems to investigate, Ecology can therefore, as Jakobsen expresses it, say something important about the biological world and how we should relate to it.

Further, I find it reasonable to conclude from this historical review that the relevance of the Ecological Element and the precautionary principle is supported by more or less all of the different theories, whether it is the chaos theory or the various stable state theories.

Lastly in this section, it should be mentioned that Jakobsen’s first and second issue about functional interrelations and functional organisation touch upon the value questions that will be addressed in relation to functional groups later in this review of the biological approaches.

### 4.4.2 Stability issues – resistance, resilience, equilibrium

The following is a review of some approaches in contemporary ecological science to the question of stability and equilibrium. This is based on the three textbooks of Begon, Harper and Townsend, Krebs, and Molles. Despite that stability and equilibrium are widely discussed terms in ecological science, the review shows that there is little support in contemporary literature for the idea that natural communities and ecosystems are generally stable and
represent states of equilibrium. This implies, as will be shown in the following, that sustainability as such might be questioned, but that it should still be reasonable to maintain the Ecological Element as a relevant part of the Sustainability Context.

Begon, Harper and Townsend (1996 p.838-840) say that during the 1950s and 1960s, the conventional wisdom in ecology was that increased complexity within a community leads to increased stability. They go on to say, however, that this has by no means always received support from more recent works, and has been undermined particularly by the analysis of mathematical models. Molles (2002 p.383) says that though ecological theories and models often assume that environmental conditions remain more or less stable, which is a state that ecologists refer to as one of equilibrium, most natural environments are subject to various forms of disturbance. Also Krebs (2001 p.460) is sceptical to the classical theory, which he terms the classical equilibrium assumption of community ecology. He (ibid. p.391-392) says that modern community ecologists are divided over the issue of whether communities should basically be considered to be in equilibrium or not. Krebs contends that equilibrium is an abstraction which will not be found in its pure state in natural communities, since communities in general are subject to change, and equilibrium may never be reached. Real communities will rather be spread along a continuum from equilibrium to nonequilibrium, he concludes.

In light of this, where a big question mark is placed by the classical stability theory, some examples will be given of how the three textbooks describe ecosystem stability and equilibrium. The simplest definition of stability, Molles (2002 p.467) says, is the absence of change. This might appear in biological communities or ecosystems where there has been no disturbance, he explains. An example is the benthic communities of the deep sea that may remain stable over long periods of time because of invariable physical conditions. This type of stability resulting from absence of disturbance is according to Molles not particularly interesting to ecologists. More interesting, he says, is how communities and ecosystems may remain stable even when exposed to disturbances. Rather than define stability as the lack of disturbance and absence of change, ecologists therefore define stability as the persistence of a community or ecosystem in the face of disturbance. This is also what is of interest in the present investigation, exemplified by the case study, where the focus is on the disturbances salmon farming might cause for ecological entities.
Resistance and resilience – relevance of Ecological Element?

Molles (ibid. p.467-468) describes two kinds of persistence against disturbances. One is resistance, which he says is the ability of a community or ecosystem to maintain structure and function in the face of disturbance. This should mean that the community or ecosystem, if it contains ecological entities that contribute to flourishing, would maintain these entities also after a disturbance. Communities or ecosystems that are stable in this sense might then be said to represent good bases for sustainability. There would be little or no changes in ecosystem goods and services, and the values behind biodiversity of interest for flourishing would then more or less be maintained. This is actually a situation where awareness of ecosystem processes is not really essential or vital. The Ecological Element of the Sustainability Context would then be less important.

The other kind of persistence is resilience, which is the ability of a community or ecosystem to return back to a stable state after disturbance. If a community or ecosystem returns back to its original structure and function after a disturbance, Gunderson et al. (2002 p.4) describe this as engineering resilience. Stability in this sense might, like resistance, represent a good basis for sustainability, and less need to care about the Ecological Element. If, however, the result of resilience is that a community or ecosystem after disturbance returns back to a different structure and function, then Gunderson et al. term this ecological resilience. They describe this as a situation where the systems shift from one stability domain to another. For this kind of stability the risk is that ecological entities which contribute to flourishing might not be maintained after a disturbance. Communities or ecosystems that are stable in this sense might therefore be more difficult to sustain in a way that will secure all aspects of human needs and preferences. Awareness of ecosystem complexity and uncertainty with regard to the ecological processes will therefore be essential. It might be asked if sustainability as such has any relevance in this connection. It simultaneously addresses that the Ecological Element with the input from the role of science and the precautionary principle will be highly relevant.

Local, global, fragile and robust stabilities – complexity and sustainability

Begon, Harper and Townsend (1996 p.838), who also include resilience and resistance in their definition of stability, add some other aspects to this. One of these aspects is a distinction between local and global stability. By local stability they mean the tendency of a community to return to its original state, or something close to it, when subjected to a small perturbation. Global stability is this tendency when the community is subjected to a larger perturbation.
Another of Begon, Harper and Townsend’s additional aspects of stability is the distinction between what they call dynamically fragile communities and dynamically robust communities. A community is said to be dynamically fragile if it is stable only within a narrow range of environmental conditions. Conversely, it is dynamically robust if it is stable within a wide range of conditions. These different kinds of stability descriptions point towards the recognition that ecosystems are variable and complex, that ecological processes are difficult to predict, and thus once again that the Ecological Element is relevant. But at the same time they address, though in different degrees, that some kinds of stability exist. This points therefore towards the relevance of sustainability as such, and of talking about the Sustainability Context.

The last aspect of stability mentioned by Begon, Harper and Townsend (ibid. p.856-858) is that the perceived degree of stability may vary according to the properties used to describe or measure stability. These are demographic properties such as identity, number and density of species, or non-demographic properties of a community such as productivity, biomass, nutrient cycling or energy flux. These are all properties linked with special kinds of interests and thus value dimension of stability, which will be handled later in this review of the biological approaches. This relates to the question of functional interrelations and functional groups.

**Equilibrium – no predictability**

Krebs 2001 p.459-460) focuses on equilibrium in his discussion of stability. He describes communities to be in equilibrium when nature is in a state of balance and species abundances remain constant over time. Krebs explains that equilibrium models are restricted to the behaviour of a system near an equilibrium point, whereas nonequilibrium models consider the transient behaviour of a community as it moves from one stable steady state to another. The description of nonequilibrium systems sounds equivalent to the description of ecological resilience, which represents communities or ecosystems that return to different structures and functions after disturbance. Since such communities and ecosystems would be difficult to sustain, and their ecological processes difficult to predict, the talk about sustainability as such might be questioned. At the same time this addresses the relevance of the Ecological Element with the input from the role of science and the precautionary principle.
Equilibrium means in most cases stable equilibrium, Krebs (ibid. p.459) explains further. He describes unstable equilibrium as a situation where small disturbances can bring a community out of a state of equilibrium. This might be equivalent with what Begon, Harper and Townsend (1996 p.838) call dynamically fragile communities. For stable equilibrium Krebs (2001 p.460, 477-478) divides communities into those which are locally stable and those which are globally stable. Equivalent again with Begon, Harper and Townsend, Krebs says that locally stable equilibrium is when systems respond to small temporary disturbances within specified environmental ranges by returning to their original positions, while systems are globally stable if they return to their original position after large environmental disturbances. In most cases, Krebs says, real-world communities are merely locally stable, and only a few communities are globally stable. These various descriptions of equilibrium add to the recognition that ecological processes are difficult to predict, that ecosystems are complex and uncertain, and that the Ecological Element is relevant.

As referred to by Jakobsen, the above references to Molles, Begon, Harper and Townsend and Krebs show that, generally speaking, some kinds of stability do appear, at least temporarily and spatially. This supports after all the relevance of thinking in the terms of sustainability and to have the Sustainability Context described for the present investigation. In addition, since predictions about ecosystem processes are apparently hard to make, the relevance of the Ecological Element, with input from the role of science and the precautionary principle, seems again to be supported.

### 4.4.3 Stability and biodiversity – dependency or not

A special stability issue is the relation between stability and biodiversity. This is a topic that has been debated for a long time (Fonseca and Ganade 2001 p.118). Begon, Harper and Townsend (1996 p.838) say, as mentioned, that during the 1950s and 1960s the conventional wisdom in ecology was that increased complexity within a community led to increased stability. This hypothesis, that diversity promotes stability, is according to Krebs (2001 p.483) a key argument in conservation programmes. Ecological generalisation of this kind, he says further, is supported by field data and by theoretical analyses, but we do not know if it is true for all communities (ibid. p.482-483). Begon, Harper and Townsend (1996 p.838-847) are more critical. In their references to recent work showing that it is not necessarily the case that increased complexity leads to increased stability, they claim that most models actually
indicate that stability tends to decrease as complexity increases. Nonetheless, they continue, it would be wrong to replace the former wisdom with the latter, because the conflicting results suggest that no single relationship will be appropriate in all communities. The conclusion they make is that we might expect to see complex and fragile communities in stable and predictable environments, while we will see simple and robust communities in variable and unpredictable environments. As a consequence of this, they assert that complex, fragile communities of relatively constant environments are more susceptible to outside disturbance than simpler, more robust communities that are more exposed to disturbances.

Molles (2002 p.389-390) says that species diversity is higher in complex environments because of such as heterogeneity in physical, chemical and nutrient conditions. He also says that species diversity is higher in environments with intermediate levels of distribution because a wide array of species can colonise open habitats. The effects of human influences on the biosphere over thousands of years fall within the framework of the intermediate disturbance, which thus result in increased diversity, Molles maintains.

Again there seems to be no documentation available of clear cause and effect relations that might be used to explain ecosystem stability and dynamics. The impression that ecosystems are complex and uncertain, as well as the relevance of the Ecological Element, seems to be reinforced irrespective of the approach taken with regard to stability. The effort to analyse and group the different relations between biodiversity and ecosystem functioning, described in the following, illustrates that only general statements about different conditions are made, and that it is almost impossible to describe anything that can be used for more specific predictions.

**Three classes of hypotheses – rivet, keystone, idiosyncratic**

When discussing the relation between stability and biodiversity, references are often made to an early observation by Ehrlich and Ehrlich (*Extinction, The Causes and Consequences of the Disappearance of Species*, 1981) (Fonseca and Ganade 2001 p.118). The observation is that continued species extinction leads to irreversible degradation of ecosystem processes and functions, such as the maintenance of biogeochemical and hydrological cycles, climate control, decomposition and soil formation. In a brief description of the history of research related to biodiversity and ecosystem functioning, Naeem, Loreau and Inchausti (2002 p.6) refer to a variety of more than 50 different central hypotheses concerning the ecosystem consequences of biodiversity loss. They group these hypotheses into three classes. The first
class is hypotheses that state that species are primarily redundant. This means that species are at least partly substitutable, in the sense that loss of species is compensated for by other species or that the addition of species adds nothing new to the system. One such hypothesis is the Rivet hypothesis, which they accredit to Paul and Anne Ehrlich. This hypothesis says that redundancy is important to a point where too many species are lost and the system fails, much the way an engineered system fails when it loses too many rivets.

The second class is hypotheses that state that species are primarily singular. This means that species contribute to ecosystem functioning in ways that are unique, and the loss or addition of species therefore causes detectable changes in functioning. Keystone species, which can be defined as species whose impacts on its community or ecosystem are large and greater than would be expected from its relative abundance (Mooney et al. 1995 p.290), are often cited as examples of singular species. A keystone hypothesis would therefore be that the functioning of an ecosystem plummets as soon as a keystone species is lost from the system (Naeem, Loreau and Inchausti 2002 p.6).

The third class of hypotheses is when species impacts are unpredictable. Naeem, Loreau and Inchausti (ibid. p.6) refer to this as idiosyncratic context-dependant impacts, meaning that a species makes different contributions to ecosystems depending on both extrinsic and intrinsic factors. Extrinsic factors, as I understand it, refer primarily to abiotic processes such as disturbances and climate, while intrinsic factors are biotic factors such as competition, predation, mutualism, community structures, food webs and energy flow. In many cases an idiosyncratic response is expected when diversity is extremely low and each deletion or addition is the equivalent of removing or adding keystone species. Naeem, Loreau and Inchausti comment that idiosyncratic does not mean that variations in biodiversity have no effect on ecosystems, nor does it necessarily imply that response to variation in diversity is unpredictable. They hold that it merely implies that the slope of the relationship is not monotonic.

Naeem, Loreau and Inchausti (ibid. p.6) describe the three hypotheses outlined above as a heuristic framework that serves to organise our thoughts about the relationship between biodiversity and ecosystem functioning. It should be recalled that in the review of the UN-related approaches, it was mentioned that Lemons and Brown refer to the heuristic value of analytical tools used in environmental problem solving, and they say further that the heuristic
framework also provides a clear picture of what needs to be tested. This is also how I perceive it when the different hypotheses describe different possible scenarios, without qualifying clearly when and where these might happen. In addition to guiding the directions and priorities of science, the different theories also indicate how the precautionary principle might be applied. This is in the sense of increasing the awareness of what risks might be encountered when ecosystems are disturbed.

**Functional groups – species extinction**

In relation to the effects of biodiversity on ecosystem functioning, Fonseca and Ganade (2001 p.118 -121) have done some statistical calculations for predicting how many species can go extinct before a community loses its first functional group. When speaking of functional groups, Fonseca and Ganade are mostly concerned with functional classifications that group species in relation to their effect on the functioning of communities and ecosystems. This means, Fonseca and Ganade say, that since species may play equivalent roles, they may be functionally redundant in the sense that some of them could go locally extinct without a substantial loss in ecosystem function. Hooper et al. (2002 p.195) say linked to this that ecologists have used a variety of ways to define functional groups. This has been as sets of species showing either similar responses to the environment or similar effects on major ecosystem processes. In addition, they say, functional groups can be identified without *a priori* classifications regarding particular responses to environment or influences on ecosystem processes.

Fonseca and Ganade (2001 p.118 -121) found that the probability of a whole functional group becoming extinct from a given community increases with the number of recognised functional groups. The number of recognised functional groups they refer to as the functional richness. On the other hand they found that the probability of a whole functional group becoming extinct decreases with richness of species and the evenness in the distribution of species among functional groups. Despite these conclusions, however, they were not able to make more specific predictions of how many species can go extinct before a community loses its first functional group. Their motivation for doing these calculations is that the current rate of local and global extinction will inevitably lead to communities being simplified in terms of both species and function. They also see this as a useful index for conservation purposes. Theoretical and empirical investigations of the relationship between species and functional richness are thus increasingly important, they maintain. Fonseca and Ganade hold that the
question of how many species extinctions can be supported before a community suffers the extinction of the first functional group is at the heart of the redundancy controversy.

Referring again to Ehrlich and Ehrlich, who already in 1981 had foreseen the unpredictability pattern of species extinction on ecosystem function, Fonseca and Ganade (2001 p.122) conclude that the only thing we know is that if we lose one species we can confidently predict what should happen to the ecosystem, but if a few species are lost we can only guess. To illustrate this they say that although one might imagine that species-rich communities like tropical forests will tend to contain more functional groups than species-poor communities like boreal forests, this does not have to be the case.

Fonseca and Ganade’s conclusion about losing functional groups, added with the mentioned heuristic framework constituted by the different hypotheses concerning ecosystem stability and biodiversity, points again towards the recognition that ecosystems are complex and that their processes are uncertain, and thus supports the relevance of the Ecological Element. This also addresses the question of predictive power in ecology, which will be reviewed in the following two subsections.

4.4.4 Predictability – possible or not

The first subsection about predictability concerns equilibrium models, where the challenge in relation to predictions is demonstrated, while the second subsection reviews some perceptions of whether predictability at all is possible in ecology.

Equilibrium models – predictability?

Krebs (2001 p.459-460, 482-483) says that the classical equilibrium models are characterised by constant species composition, biotic coupling by an interlocking web of life, saturated units, resource limitation, density dependence, optimality, few stochastic effects, tight patterns and rare occurrences of weather catastrophes. Contrary to the classic equilibrium models, Krebs explains, nonequilibrium models focus on characteristics such as species independence, biotic decoupling, unsaturated units, abiotic limitation, density independence, opportunism, large stochastic effects, loose patterns and frequent climatic catastrophes. In both cases, whether equilibrium or nonequilibrium models, the listed elements characterising the models
illustrate that ecosystems are complex. The nonequilibrium models in addition point towards little predictability in relation to ecological processes.

The focus of the nonequilibrium models, Krebs (ibid. p.494-495) explains, is on patches and disturbance. Patches refer to the spatial scale of a system, where change rather than stability seems to be the rule, according to Krebs. The challenge to ecologists is to incorporate the various measures of disturbance in the field into their models in their efforts to understand how disturbances affect particular communities. Such models utilise five general types of mechanisms to explain why communities tend to persist, Krebs says. Two of these mechanisms involve spatial patchiness, meaning that stability can be achieved at the landscape level, though there might be instabilities at the local patches. If species go extinct in some patches they may persist in others, and thus also in the landscape as a whole. The third mechanism Krebs refers to as stabilising interactions, such as when the number of prey eaten per predator at a certain point reaches a satiation where increased prey density has no effect on the number eaten. The fourth mechanism is, paradoxically, disturbances that contribute to prevent competitive exclusion, while the fifth is compensatory changes in reproduction, survival and movements. All these different mechanisms and the structure of nonequilibrium models in general point again towards the recognition that ecosystems are variable and complex.

Among other writers that support the ideas of nonequilibrium are Lemons and Morgan (1995 p.94). They say that the concept of ecosystem stability, and to what extent it might have any real ecological meaning, has been questioned by many scientists. Their view is that the nonequilibrium paradigm includes ideas that natural systems are open, that processes rather than endpoints are emphasised, that a variety of scales are considered and that episodic disturbances are recognised. Lemons and Morgan refer in this connection to Kay (A Nonequilibrium Thermodynamic Framework for Discussing Ecosystem Integrity, 1991), who says that we must focus on the processes of ecosystems and maintain the dynamics of the system while recognising that change and disturbance are important to the continued health or integrity of ecosystems. They also refer to Angermeier and Karr (Biological Integrity versus Biological Diversity as Policy Directives, 1994), who warn that if we maintain static ecosystems so that they provide resources and services to humans on a sustainable basis, then significant and perhaps unrealistic levels of intervention in biological and ecological systems may be required of resource managers. Angermeier and Karr propose a concept of ecological
integrity rather than biological diversity because the former emphasises the processes of ecosystems rather than the presence of particular elements. Linked to this is also Jakobsen’s statement when he says that the new ecology sees nature as open structures where non-expected and non-periodic incidents may influence the systems’ structures and functions.

The development of nonequilibrium models together with Krebs’ recognition that equilibrium may never be reached in nature and the comments about a nonequilibrium paradigm and open dynamic ecosystems add to the perception that ecosystem processes are uncertain. When in addition Lemons and Morgan say that many scientists have questioned whether the concept of ecosystem stability have any real ecological meaning, this may undermine the whole idea of sustainability and thus the decision in the present investigation to focus on sustainability and to handle the research questions within the Sustainability Context.

But still, as long as there are references to stability and equilibrium on a local and temporal scale, this points, as mentioned a few times, towards the relevance of considering sustainability as such. It also justifies that the role of biological science in continuing the search for knowledge both of what we know and what we do not know about ecosystem complexity and uncertainty. Jakobsen (2005 p.130) seems to support this view on stability when he says that without relatively stable environments for a period of time, the conditions would not last that are necessary for organisms and species to adapt properties and traits. Further, the general impression from this review of stability and equilibrium is then that the variety of descriptions found in the ecological literature in itself shows that ecosystems are complex, and that ecosystems in nature seldom are stable or have states of equilibrium. This supports again the relevance of the Ecological Element.

The above indicate, as I perceive it, that it is relevant to ask to what extent, if at all, predictability is possible in ecology. This will be discussed in the following.

**Predictability – state of ecological science**

Philosophers such as Sagoff, Shrader-Frechette and McCoy are critical of the science of ecology because of the limited predictive power in ecology (Jakobsen 2005 p.108). Sagoff says, according to Partridge (2000 p.2), that ecosystems are in fact devoid of system. One way Sagoff (1997a p.923) expresses this is by saying that ‘the terms “eco” and “system”, when conjoined, constitute an oxymoron’. He (ibid. p.901) says further that this is because ‘the
ecosystem as an object of scientific inquiry is just a pointless hodgepodge of constantly changing associations of organisms and environments’. Partridge (2000 p.2) says that one conspicuous point made by Sagoff is that the principles of theoretical ecologists cannot predict and are not falsifiable, and thus by implication they are not confirmable and are thereby devoid of scientific significance. Shrader-Frechette and McCoy (1993 p.109-110) seem to agree with Sagoff when they say that ecology is more empirically and theoretically underdetermined than many other sciences. They add to this that ecology is characterised by a bottom-up case study approach rather than a top-down hypothetical-deductive approach where practical events can be deduced from general theories. Ecology thus fails as a grand and comprehensive theory, and cannot predict events (ibid. p.8, 119). Further, they (ibid. p.110) argue that this is due in part to ‘the uniqueness and historical character of many ecological phenomena’. They (ibid. p.8) advise that we confine our ecological attention to empirical natural history knowledge and individual case studies. With reference both to Sagoff and to Shrader-Frechette and McCoy, Lemons and Brown (ibid. p.17) say that environmental studies must be based on inductive reasoning with a heuristic power, and cannot be deductive with a predictive value. Ecology has failed to develop predictive laws, they (ibid. p.19) continue, because ecological systems are so inherently complicated. These complexities of ecosystems has by recent advances in chaos theory called into question whether it is even possible to make long-term ecological predictions with any certainty, they (ibid. p.17-18) say further, concluding that the role of ecological science should be considered to be a heuristic science based on case studies.

Lemons and Morgan (1995 p.96) agree that both informational and theoretical uncertainty exist and are so pervasive that the science of ecology and conservation biology should be considered as having heuristic value. They further agree that the science of ecology thus has no predictive capabilities suitable as a firm basis for decisions about intensive management of biological resources, and (ibid. p.80) that there is no inherent single state for which ecosystems can be managed in the long-term. A precautionary approach to protection of biodiversity, they (ibid. p.96) contend, might therefore be to shift the burden of proof to those seeking to undertake activities that potentially threaten biodiversity, and who must then demonstrate that their activities will not cause harm.
Since ecosystems are not closed, they (ibid. p.89) conclude that effective management of biodiversity demands that structural, functional, temporal and spatial scales be chosen carefully, yet it is rarely possible to make choices on sufficiently precise data.

The critical comments to the science of ecology referred to above are partly admitted by the ecologists behind the three ecology textbooks. Krebs (2001 p.10) says that we know an enormous amount about the molecular and cellular levels of organisms, while we know relatively little about populations and even less about communities. Begon, Harper and Townsend (1996 p.944) say that we have almost no idea about such as the relationship between ecosystem processes and species richness. Molles (2002 p.454) is a little more optimistic with regard to the ecological knowledge base and the predictability of ecology. He holds that in many cases the general direction of change in community structure and ecosystem processes is predictable, at least over the short term. Molles (ibid. p.310) explains that mathematical and laboratory models are generally much simpler than the natural circumstances the ecologist wishes to understand. However, while sacrificing accuracy, this simplicity offers a degree of control that ecologists would not have in most natural settings. He (ibid. p.383) explains further that most mathematical models assume that environmental conditions remain more or less stable, and that laboratory studies generally maintain constant environmental conditions. Molles (ibid. p.468) adds that ecologists ask many questions about stability, but few studies have been conducted at scales appropriate to address these questions. The main reason for this, he says, is that such studies need long time periods.

Again there seem to be good reasons to hold that the Ecological Element of the Sustainability Context is relevant. This time due to the uncertainties pertained to the predictive power of ecology. Linked to this is also the need of the precautionary principle due to the limited possibilities science has to produce clear and foreseeable knowledge about ecosystem processes.

4.4.5 Stability – value dimensions

This last part of the review, before the intermediate summary, focuses on value-related issues of the Cultural Element. It starts with three subsections about functional groups and ends with one subsection about value-laden science. The first of the three subsections about functional groups addresses the value dimension in general, while the other two discuss functional
groups from the perspective of available goods and services, and from a more strictly and purely scientific perspective.

It should be recalled that functional groups refers to groups of species sharing some common functional attributes, while species redundancy means that species are at least partly substitutable, in the sense that loss of species is compensated for by other species or that the addition of species adds nothing new to the system.

**Functional groups – value dependent**

Experiments assessing the effects of biodiversity on ecosystem functioning, and assessing whether such relationships exist, were initially solely aimed at taxonomic measures of species riches Hooper et al. (2002 p.195) say. They hold that using species richness in this way as a simple measure of biotic diversity has no explicit explanatory power, because ecosystem level processes are affected by the functional characteristics of organisms involved rather than by taxonomic identity. If aiming at understanding the biodiversity effects on ecosystem processes, functional attributes of species must be considered, they maintain. Ecosystem processes referred to are such as primary and secondary production, biomass, energy flow, nutrient cycling, decomposition, nutrient retention, carbon sequestration, water relations and resistance and resilience to perturbations (Grime 1998 p.903 and Hooper et al. 2002 p.197).

Linked to this Vitousek and Hooper (1993 p.4-5) say that the selection of functional groups is often decided by ecosystem processes of interest. Similarly, Fonseca and Ganade (2001 p.122) say that definitions of functional groups will depend on the aim and use in mind. Both these references indicate, as far as I understand them, that selections of functional groups depend on which ecosystem goods and services are of interest. This focus on ecological functions of interest indicates that the selection or classification of functional groups depends on value preferences. In the context of the present investigation this means that selections of functional groups might be influenced by or depend on needed and preferred values behind biodiversity.

**Functional groups and species redundancy – perspective of available ecosystem goods and services**

Fonseca and Ganade found, as mentioned, that the number of functional groups is decisive for how many species can go extinct before a community loses its first functional group. This
should mean that if many functional groups are described for a system, then species extinction would lead to an earlier loss of the first functional group than if few functional groups are described. Translated to perceptions of sustainability, this should imply that if only a few functional groups are described for a system, then the system will be perceived to be more stable and sustainable than if many functional groups are described.

If this is the case it might be interpreted to mean that perceptions of sustainability will depend on the number of values behind biodiversity that are prioritised. This means that the perceptions of sustainability are related to whether functional groups are lost or not, and that selections of functional groups depend on needed and preferred values behind biodiversity. Few prioritised needed and preferred values behind biodiversity would then result in few functional groups and thus a perception of sustainability. Conversely, a wide range of needed and preferred values behind biodiversity would then result in a great number of functional groups and thus a perception of less stability and lack of sustainability.

As an extreme observation in this connection, Fonseca and Ganade (2001 p.123) say that if functional groups are discussed only in terms of major ecosystem processes, such as carbon fixation, nutrient cycles and water retention, then species redundancy makes it conceivable that a dozen plant species will be sufficient to fulfil all roles. In relation to this Lemons and Morgan (1995 p.80-81) refer to Robinson (The Limits to Caring: Sustainable Living and the Loss of Biodiversity. 1993) who says that species from earlier successional ecosystems, which have less biodiversity, can be utilised to maximise production and harvest. This entails, Robinson says further, that ecosystems managed at more intensive levels will be less biologically diverse, but will support more people with higher quality of life than those managed at less intensive levels. Linked to this, it might be suitable to recall that Begon, Harper and Townsend say that simpler, more robust communities are less susceptible to outside disturbance than complex, fragile communities of relatively constant environments.

Ghilarov (2000 p.410) follows the same extreme line of thinking as Fonseca and Ganade intimate when he states that all biogeochemical functions of ecosystems can actually be fulfilled by simple prokaryotic organisms. He refers in this connection to Zavarzin (Individualism and system analysis as two approaches to evolution, 1999) who says that the origin of eukaryotic organisms did not add anything new in biogeochemical processes, and therefore did not increase the functional diversity of the biosphere. Further referring to Sagan
et al. (A search for life on Earth from the Galileo spacecraft, 1993), Ghilarov says that it is not surprising that evidence of life revealed in 1990 by the spacecraft Galileo from a distance of 1000 km was the same as it would have been two billion years ago, in times of a prokaryotic biosphere.

Odenbaugh (2003 p.62) refers to Sagoff (1997b p.522-523) who argues that ecosystems generally contain immense functional redundancies, which means that if one species goes extinct there will be a functionally equivalent surrogate that can take its place. Further, Sagoff claims that in some ecosystems the important interactions that shape ecosystem functions are between just a few keystone species. Many of the species in the ecosystem therefore have no directly relevant functions with respect to the valued services of an ecosystem. Odenbaugh (2003 p.67) questions Sagoff’s conclusions by referring to Tilman and Downing (Biodiversity and Stability in Grasslands, 1994), who have found that the drought resistance of an ecosystem increases as the number of plant species increases. Odenbaugh warns that there always is a risk when eliminating redundant species, and that we are quickly on the road to eliminating entire functional groups and hence the life supporting services.

Generally, Fonseca and Ganade (2001 p.123) say, there is a need for a more complete and useful identification of functional groups, where also community and population processes should be included. Ghilarov (2000 p.410) similarly concludes that such criteria as primary production, CO2 consumption and O2 release are not optimal when we are trying to justify the necessity to conserve biodiversity. Related to this, Lemons and Morgan (1995 p.79-80) warn that if humans use the earlier successional ecosystems, which are less biologically diverse, these require energy and material input, and create pollution. In addition, they say, this occurs at the expense of more natural ecosystem types.

Though not specifically discussing functional groups, Jakobsen (2005 p.130) seems to follow the idea of a more complete identification of functional groups when he takes an evolutionary approach to the question of stability. This is when he says that without relatively stable environments for a period of time, the conditions would not last that are necessary for organisms and species to adapt properties and traits. In that sense, he continues, ecosystems are important in the evolution processes, and evolution itself can in many ways be a basis for maintaining ecosystems as integrated units. Without some stability and balance in the ecosystems, evolution would not be possible, he (ibid. p.141-142) concludes. This should
mean that even if a selection of values behind biodiversity due to redundancy can be secured with a small number of species, there is a risk that the evolutionary processes may be hampered by the ensuing consequences.

All this shows more or less that when functional groups and species redundancy are discussed in the perspective of available ecosystem goods and services, there are value questions involved. This links to the Cultural Element of the Sustainability Context, and supports the relevance of this and the research question of “Sustainability of what?”. Species redundancy also points towards the relevance of using substitutability as a mechanism in relation to equity judgements, since there are situations where one species or ecological entity can be substituted by another and still achieve the same function or value behind biodiversity. But still, despite all kinds of redundancy and possible species substitutes, there seems to be a basic need of awareness of the kinds addressed by the Ecological Element.

**Functional groups and species redundancy – more strictly and purely scientific perspective**

Even in the more strictly and purely scientific context, Hooper et al. (2002 p.195-197) say that it is unlikely that there will be a single functional classification that is universally appropriate. One possible alternative of such classification is, as mentioned, to define functional groups without *a priori* classifications regarding responses to the environment or to the influence on ecosystem processes. This could be such as N-fixers, fungi, bacteria, grassers, browsers and size of prey consumed. Another alternative, they say, is as sets of species showing either similar responses to the environment or similar effects on major ecosystem processes. While the first alternative might be seen as relatively value free, the last is probably not. Other examples of scientific classifications are when Naeem, Loreau and Inchausti (2002 p.7) say that functional groups are sets of species that are similar and at least partially substitutable in their contribution to a specific ecosystem process, and when Vitousek and Hooper (1993 p.4-5) define functional groups as sets of species that have similar effects on a specific ecosystem level biogeochemical process of interest. Though the definition of functional groups in both of these examples appears to be science-motivated, they might just as well be utility-motivated with focus on ecosystem goods and services. This illustrates that it is difficult to sort between utility interests and purely scientific motivations, and that value considerations seem to be unavoidable even in pure science.
A final example demonstrating this is the scientific discussion about invasion of exotic species. Thompson et al. (2001 p.1058) argue that the processes that facilitate invasion by exotic plant species and colonisations of native species are fundamentally the same. One of the references they use to support this is detailed studies of the traits of exotic invaders and native colonisers in Northwest Europe, which showed that the two groups were essentially indistinguishable. Thompson et al. (ibid. p.1054) conclude that invasions are actually promoted by an increase in the availability of resources, either through the addition of extra resources or a reduction in their use by the resident vegetation. This conclusion is consistent, they (ibid. p.1058) say, with the hypothesis proposed by Davis et al. (Fluctuating resources in plant communities: a general theory of invasibility, 2000), namely that invasibility is correlated with availability of unused resources. On the other hand, Thompson et al. (2001 p.1058) say, others like Elton (The Ecology of Invasions by Animals and Plants, 1958) and Dukes and Mooney (Does global change increase the success of biological invaders?, 1999) would argue that invasions by exotic species are a distinct ecological phenomenon, quite separate from the normal processes of regeneration, colonisation and succession. Linked to this Mooney et al. (1995 p.291) say that since most species belong to more than one functional group and affect species belonging to other functional groups, predictions of the overall consequence of a deletion or addition are complex.

This final conclusion by Mooney et al., that the role of functional groups is complex, should hold true as a general conclusion for the whole discussion of functional groups and species redundancy. Part of this complexity can then be attributed to the value dimension of the classifications of functional groups. This means again that classifications of functional groups seem to depend on the perceptions of values behind biodiversity. This points specifically towards the relevance of the Cultural Element and the research question of “Sustainability of what?”. From the recognition that value considerations seem to be unavoidable in science, the review will continue with some reflections on value-laden science, with special focus on the biological science.

**Value-laden science – buzzwords**

Krebs (2001 p.12) says that the strongest discussion about values in biology has involved conservation biology. He asks whether conservation ecologists should be objective scientists studying biodiversity, or whether they should be public advocates for preserving biodiversity. The preservation of biodiversity is, he says, a value that often conflicts with other values, such
as clear-cut logging that produces jobs and wood products. This relates to the kind of arguing by use of the buzzwords mentioned in Chapter 1 (Introduction – research area). This is the kind of arguing where value-laden buzzwords, such as biodiversity, might be perceived as more sublime or elevated than other more prosaic and often economy-related value terms. Concern was also expressed in Chapter 1 (Introduction – research area) over the risk that the mixing of biological facts and values might be detrimental to an upright and honest debate or discourse in the field of the environment.

In this connection, Weiner (1992 p.406) warns of the danger of myth creation in the more modest forms found among some groups of environmentalists. He says that myths can be used effectively to achieve massive changes in humans’ attitudes and behaviour, as done in an extreme way in fanaticism. Weiner’s basic concern seems to be that as long as the perceptions of values vary with individual preferences, no single view or myth can have a privileged status. He (ibid. p.385) states in this connection that advocates of one world view or another have with rare exceptions tried to assert its privileged status by reference to an absolute validating authority. Weiner mentions religion, science or “Nature” as examples of such authorities, which then seems to work comparable with what I say about buzzwords. In regard to science, Weiner (ibid. p.405) says further that no technocrat can determine the greatest good on the basis of some secret expertise or privileged knowledge. I interpret this use of the term “technocrat” to include biologists.

Weiner (ibid. p.405) uses the term privileged knowledge to describe situations where facts and data are used by resourceful and articulate people to convince others of certain value perspectives. As an example he refers to the radical ecological movement, which he states argues from privileged knowledge when they assert that ‘We know what is really best for you, what will cure you’. Weiner elaborates this in the following passage, which pertains to scientists and experts in general just as much as the radical ecological movement:

They alone know the distinction between natural harmony and disorder, social health and corruption, pollution and purity, alienation and unity. They do not recognise the social construction of their ethical beliefs and political visions; they absolutize their individual truths. They may be right, but what if they are not …? (Weiner 1992 p.405-406)
We need to resolve, Weiner (ibid. p.405) says, our disparate visions of the uses of nature politically, without resorting to privileged knowledge. The central part of this message is that when appealing to science, it is important to be explicit about underlying moral and political agendas. He (ibid. p.406) concludes that if we become aware of our own needs and value preferences, and take responsibility for them as individual preferences, then we will be in a good position to respect and compromise with our neighbours. Robertson and Hull (2003 p.1) also refer to Weiner in a discussion of scientific knowledge as a basis for political decision making. They describe an attitude among environmental scientists saying that things would be better ‘if only we could educate the public’. Such an attitude implies, according to Robertson and Hull, that ignorance prevents decision makers from adopting the policies that scientists think best. If, in line with this, functional groups are selected by experts or on the basis of privileged knowledge, then I am afraid that this might influence what lay people perceive as important sustainability goals, which may be different to what they actually believe themselves.

Odenbaugh (2003 p.65), when discussing conservation biology, recommends that ‘[i]t is important that an audience does not confuse the personal values of a scientist with his/her empirical work’. In the same way, Krebs (2001 p.12) says that it is crucial that scientists separate their role of carrying out objective science from being advocates of particular policies. Another way of addressing this is when Lemons and Brown (1995 p.17) express the ‘need to make value judgements at all stages of problem identification, analysis and solution implementation’. Lemons and Morgan (1995 p.104) advise that appropriate decision making procedures will need to be developed to decide what values should have precedence over others. This is actually what the present investigation focuses on with the development of the conceptual model.

As an example of possible different value grounds it is tempting to mention the difference between how Lomborg (2001) concludes and how such as the UN reports conclude with regard to whether we have an ecological crisis or not. Lomborg (ibid. p.159-160) states that we are not overexploiting our renewable natural resources, and that our societies certainly seem to be sustainable. Conversely, the UN reports state that we have problems in this field. One indication that this might be due to different value grounds is Lomborg’s statement that we have to realise that investing in an ever better environment is only one of the many ways to invest in a better world. We must prioritise, he (ibid. p.327) says, the environment as
against better education, more health care and better infrastructure. Though the UN reports also address the importance of fulfilling human needs and preferences, it seems that Lomborg is willing to sacrifice more of the natural environment than the others in a trade-off against such as education, health and infrastructure. On the global level, he (ibid. p.327) says, it seems obvious that the major problems remain with hunger and poverty. For the rest of the sustainability issues, such as pollution, energy, water, biodiversity and global warming, he (ibid. p.4) holds that there are no crises, and that the situation in many cases is improving. One of Lomborg’s (ibid. p.328) descriptions of the state of the world is that mankind, setting aside the poverty problems, is a ‘fantastic story’. ‘We have more leisure time, greater security and fewer accidents, more education, more amenities, higher incomes, fewer starving, more food and a healthier and longer life’ he contends.

As for the value-related review of functional groups and species redundancy, also this review of value-laden science points towards the relevance of the Cultural Element and the need to clarify value perceptions such as in the research question of “Sustainability of what?”. This is then specifically to avoid the use of privileged knowledge and to avoid that mixing of biological facts and values might be detrimental to an upright and honest debate about sustainability issues and goals.

4.4.6 Intermediate summary – biological approaches

The intermediate summar to the biological approaches will, just like for the UN-related and economic approaches, be a summary of how the findings in the review might support the relevance of the Sustainability Context. Linked to this are also some words about the role of science. In addition, to help prepare the development of the conceptual model in the next chapter, an example is given of certain topics related to the model.

Summary – relevance of the Sustainability Context and role of science

Both the historical review, the various parts of the review of stability, and the review of predictability support the perception that ecosystems are complex and that there are uncertainties with regard to their processes. This means that the relevance of the Ecological Element and the need for awareness of ecosystem complexity and uncertainty should be reasonably well supported.
What is more problematic is when Lemons and Morgan say that many scientists have questioned whether the concept of ecosystem stability might have any real ecological meaning. This might undermine the whole idea of sustainability, and thus the decision in the present investigation to focus on sustainability. Nonetheless, despite the uncertainty with regard to real ecological meaning of stability, there are references in the review that may be interpreted as supporting the idea of sustainability and thus the relevance of the Sustainability Context. This support is found both in references such as those saying that stability may occur temporarily and spatially in certain periods and specific areas, and those indicating that stability depends on functional groups of interest.

Linked to the recognition that some degree of stability and thus sustainability may occur, it seems also reasonable to hold that science has a role to continue the search for knowledge, both of what we know and what we do not know about ecosystem complexity and uncertainty.

The review of functional groups and species redundancy demonstrates that biological science, specifically when it focuses on ecosystem goods and services, but also when it has a more strictly scientific focus, is more or less value-laden. Two words of warning were made in this connection. One is that science, when prioritising activities, should take into consideration value aspects linked to the research questions of the present investigation. The other is that the value bases of scientific activities need to be disclosed. Both these warnings point towards the relevance of the Cultural Element including the two research questions of “Sustainability for whom?” and “Sustainability of what?”.

Much like how value-laden science is addressed in the UN-related approaches Krebs asks whether conservation ecologists should be objective scientists studying biodiversity, or whether they should be public advocates for preserving biodiversity. Odenbaugh’s recommendation when discussing conservation biology is that a scientist’s personal values should not be confused with the scientist’s empirical work. Weiner warns in this connection against privileged knowledge and says that it is important when appealing to science to be explicit about underlying moral and political agendas. Similarly Robertson and Hull warns against an attitude among environmental scientists saying that things would be better if only we could educate the public. This links to my concern with regard to avoid buzzwords and the risk that mixing of biological facts and values might be detrimental to an upright and honest debate or discourse in the field of the environment.
Supporting this, and also the development of the conceptual model, is Lemons and Morgan’s advice that appropriate decision making procedures to decide what values should have precedence over others will need to be developed. When Lemons and Brown in addition say that value judgements are needed at all stages of problem identification, analysis and solution implementation, this has some bearing on how the input from the biological science is made. This is in line with the recommendation given by Odenbaugh, when he says that ‘[i]t is important that an audience does not confuse the personal values of a scientist with his/her empirical work’. When biological scientists should in this way keep their value perceptions apart from the scientific knowledge, it does not mean, as I see it, that the scientists should be value neutral. Biologists should retain their personal fascination with ecological phenomena or their basic respect for nature. It is more to secure that biological science maintains its confidence and credibility by being as distinct as possible with regard to scientists separating the knowledge they present from their own value basis. Part of this value identification is to help fill the value-laden buzzwords with as distinct and specific definitions as possible.

Example – evolutionary abilities or ecosystem services

The example of certain topics related to the development of the conceptual model focuses on two aspects of sustainability. One focuses on the sustainability of ecosystems’ evolutionary abilities, while the other focuses more on the sustainability of particular ecosystem services. They represent, as I see it, two basically different value grounds with regard to ecosystems. What I think of here is that the focus on evolutionary abilities might be based on a holistic and comprehensive valuation of ecological entities, while the other is more particularly directed towards focus on specific values behind biodiversity, such as food, water and shelter, recreational values and aesthetic values. This is despite the need to take evolutionary abilities into account, at least to some extent, also when the focus is on specific values behind biodiversity. An extreme example of this last value ground is statements such as those saying that for securing the major ecosystems it is conceivable that a dozen plant species will be sufficient. These kinds of value grounds, with focus on some specific and particular values behind biodiversity, might be characterised as rather mechanical. They might further be said to have similarities with or actually to represent non-arcadian views, such as Odum’s reductionistic ecosystem model.
As a counter response to the statement that a dozen plant species will be sufficient, it is said that identification of functional groups will be more complete and useful if it includes community and population processes. Together with the demographic and non-demographic properties mentioned by Begon, Harper and Townsend, this tends towards the holistic and evolutionary value grounds. The same does Jakobsen when he addresses the importance of the interrelation between ecosystems and evolution processes. These value grounds with focus on ecosystems’ evolutionary abilities might in an arcadian way have some similarities with Clements’ organic and holistic model, or conversely, in an extreme non-arcadian way, they might represent chaos theories.

The distinction made here between the focus on the evolutionary abilities on the one hand and the particular ecosystem services on the other will be useful to keep in mind in the development of the conceptual model, particularly when discussing values behind supra-individual ecological entities.

4.5 Philosophical approach – ecological integrity, evolutionary capacity, ecosystem health

The philosophical approach chosen for the present section is the one advocated by Laura Westra\(^\text{11}\) (1998 p.6), who proposes an environmental ethics based on what she calls the principle of integrity. This is partly inspired, but also challenged, Westra (1994 p.79-80, 104) says, by nonanthropocentric positions such as Albert Schweitzer’s reverence of life ethic, Paul Taylor’s ethic of respect for nature, Aldo Leopold’s land ethic and Arne Næss’ deep ecology. She (ibid. p.27) says further that the principle of integrity uses the science of ecology in its most recent paradigm, which means that of complex systems’ theory, of which chaos theory is a subset. It also uses the laws of thermodynamics. This sounds like she bases the principle of integrity both on new ecology and on mechanical-reductionistic ecosystem models, such as explained by Jakobsen in the historical review of the biological approaches.

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\(^{11}\) Laura Westra is the driving force behind a multidisciplinary group of researchers, called the integrity group, that take a holistic view on environmental issues.
Though all the parts of the Sustainability Context will be addressed, the review of Westra’s philosophical approach will specifically touch on the Cultural Element and the questions of “Sustainability for whom?” and “Sustainability of what?”. Central is also issues related to the framework for judgements of ethical records. The review is divided into four sections. The first is about Westra’s principle of integrity and her definition of sustainability. The second handles some practical approaches to Westra’s principle of integrity. The third section is specifically about equity, while the last one is the intermediate summary.

4.5.1 Principle of integrity – sustainability

This section starts with a review of how Westra defines integrity, followed by a review of her definition of sustainability. Then follows a brief summary of what the findings in these two reviews might imply for the Sustainability Context.

Definition of integrity – ecosystem integrity, ecosystem health

Westra (1994 p.5-6) emphasises that the principle of integrity is not an attempt to formulate yet another environmental ethic. In this connection she (ibid. p.191) emphasises, as mentioned when describing the Sustainability Context in Chapter 3 (Method – a post-normal science approach), that the Harm Principle and Equity Principle are important in addition to the principle of integrity when dealing with policy options.

Westra gives a provisional definition of integrity. The following is a shortened version of this:

“Ecosystem integrity” is an “umbrella” concept that includes in various proportions which cannot be specified precisely, the following:

1. Ecosystem health and its present well-being [...]. This condition may apply to even nonpristine or somewhat degraded ecosystems, provided they function successfully as they presently are [...].
2. The ecosystem must retain the ability to deal with outside inference, and, if necessary, regenerate itself following upon it. This clause refers to the capacity to withstand stress [...].
3. Integrity obtains [...] [that] the system’s optimum capacity for the greatest possible on-going development options within its time/location, remains undiminished [...]. Biodiversity contributes to integrity [...].
4. The system will possess integrity, if it retains the ability to continue its ongoing change and development, unconstrained by human interruptions past or present. (Westra 1994 p.24-25)
As an additional basis for understanding the principle of integrity, Westra (1994 p.40) refers to the following saying of Rolston:

> We want to value the lush life that ecosystems maintain – their diversity, unity, dynamic stability, spontaneity; the dialectic of environmental resistance and conductance; the generating life forces. (Rolston 1988 p.163)

This represents, Westra (1994 p.40) says, the basis for the principle of integrity that she wishes to defend. Linked to this she adds that unity, completeness and value are among the various dimensions of integrity that go beyond the concept of ecosystem health.

In essence Westra (ibid. p.69-70) holds that various values that can be attributed to integrity are at the outset nonanthropocentric, although most have further anthropocentric applications. It is nonanthropocentric in the sense that ecosystem integrity represents an objective condition or value which, she says, reaches beyond the more culturally relative and anthropocentric ecosystem health. Ecosystem health is thus a subelement in the sense of being a necessary but not a sufficient condition of ecological integrity (ibid. p.27, 67). Points 3 and 4 in the provisional definition differentiate ecosystem integrity from the notion of ecosystem health (ibid. p.25). Ecosystem health is as a subelement distinguished from ecosystem integrity, Westra (ibid. p.27) says, by such as cultural relativity, limited time frame, overemphasis on functional attributes, social constructs and support. Ecosystem integrity, on the other hand, is a real and objective condition and not one which is defined by cultural agreements. The wholeness of integrity Westra (ibid. p.21-22) describes as representing both a natural and a cultural part, which are not always clearly separated. She (ibid. p.69) mentions that the paradigm case of integrity lies in wild, largely undisturbed ecosystems, while (ibid. p.27) most of what we can produce or use is within the realm of ecosystem health. Westra’s (ibid. p.27) aim is to show the absolute value of ecosystem integrity both as benchmark and as necessary support of ecosystem health.

Westra (ibid. p.64) says that integrity should not be seen as a value among many, but as the foundational, ultimate and universal value that must be respected and defended before any other values. When referring to the values of integrity, she (ibid. p.69-70), in addition to unity, completeness and value, uses terms such as universal and health in a nonanthropocentric sense, whole, harmony, biodiversity, sustainability and stability. Westra (ibid. p.69) holds that
integrity should represent the common global denominator of value and the most necessary one in supporting the basis for life.

**Definition of sustainability – structural and functional**

On the basis of the principle of integrity and the perspective of ecological integrity, Westra defines sustainability the following way:

1. In regard to the natural systems on earth, sustainability pertains to those systems that possess optimum undiminished capacity for their time and location for sustained evolutionary development. Hence only systems possessing integrity as we have defined it are truly sustainable, without qualifications.
2. Specifically, if our concern is with sustainable biophysical production including sustainable activities in support of human interests, then we can say that those activities (interests or forms of production) are sustainable that do not interfere with or detract from truly sustainable systems as in (1). Hence my position not only argues for ecological integrity but also ultimately defends sustainability as well. (Westra 1998 p.175-176)

Westra (1998 p.176) says that the sustainability concept in a primary sense, as described in the first point of the definition, is protected and respected every time integrity is.

Sustainability in a secondary sense, as described in the second point, is when the focus is on production and human interests. This is a derivative, she explains, of sustainability in the primary sense, just like the ecosystem health element is a subelement of the ecosystem integrity concept. In short this should mean that, the first point in Westra’s definition of sustainability describes an aspect of sustainability that focuses on ecosystem integrity, while the second point describes an aspect that focuses on production and human interest.

The aspect of sustainability in the secondary sense indicates the limits of human pursuit and activities, Westra says further, adding that there are both ecological and moral reasons for ensuring that ecological sustainability in the primary sense should be our main consideration. In this connection Westra mentions that an unsustainable lifestyle is an attack on life support systems everywhere, on groups that are unfairly burdened by the choices of other groups, and on future generations, both humans and nonhumans.

**Summary – integrity and sustainability**

I find it difficult to distinguish clearly between Westra’s definition of the integrity principle and her definition of sustainability. Therefore the following is an effort to give a joint
description of how I perceive that Westra’s environmental ethics might support the relevance of the Sustainability Context. In addition I describe how I in the further discussions interpret and will refer to Westra’s two aspects of sustainability.

Ecosystem integrity and health – sustainability for whom and of what?
The way Westra describes ecosystem integrity gives association to the research question of “Sustainability for whom?” This is especially when she says that the various values that can be attributed to integrity are at the outset nonanthropocentric, and that integrity represents an objective condition or value which reaches beyond the more culturally relative and anthropocentric ecosystem health. Her notion that the values of integrity involve terms such as unity, completeness, value, universal and harmony points the same way. This might give associations to the arcadian traditions mentioned by Jakobsen. To what extent ecosystem integrity implies that ecosystems or other ecological entities might have values as ends in themselves and have a moral stakeholder status will be discussed in Chapter 5 (Conceptual model – a primary goal). At this stage, Westra’s principle of integrity should at least give some support to the relevance of the research question of “Sustainability for whom?”.

Westra’s description of ecosystem health, as this is described in points 1 and 2 of her provisional definition of integrity and in her comments to this definition, addresses the question of “Sustainability of what?”. This is for example when she says that ecosystem health is about such as cultural relativity, limited time frame, overemphasis on functional attributes, social constructs and support. Similarly, the second aspect of sustainability addresses the question of “Sustainability of what?” with the focus on biophysical production, activities in support of human interests and ecosystem health. Finally, when Westra refers to Rolston’s statement that we want to value the lush life that ecosystems maintain in their diversity as a basis for the understanding of the principle of integrity, I think this primarily points to the question of “Sustainability of what?” rather than “Sustainability for whom?”.

It is interesting to observe that Westra, unlike the conclusion made from the review of stability and biodiversity in the biological approaches, associates biodiversity with harmony and stability. In her provisional definition of integrity she also states that biodiversity contributes to integrity.
Sustainability – *structural and functional*

For the understanding of Westra’s definition of sustainability I think it is useful to introduce her description of the terms “functional integrity” and “structural integrity”. She (1994 p.40-41) says that functional integrity is associated with stability and ecosystem health, addressed by points 1 and 2 of her provisional definition of integrity. I interpret this to point at sustainable activities in support of human interests. It might therefore be said that the second aspect of sustainability is about functional integrity. The structural integrity, on the other hand, links with points 3 and 4 of her provisional definition of integrity, and should therefore also include the unity, completeness and value dimensions of integrity. It forms the basis for both the dignity of the environment and the obligation of respect in regard to it, she explains. This points at the first aspect of sustainability. Westra’s (1998 p.95) statement that the ultimate goal of the principle of integrity is to protect and restore both structural and functional aspects of ecological integrity shows that it makes sense to link the two aspects of sustainability with functional integrity and structural integrity.

In the following, I will refer to the first aspect of sustainability as the structural ecosystem aspect of sustainability. This is then where the focus is on optimum undiminished capacity for sustained evolutionary development. The second, as a subelement of the first, is the sustainable aspect about biophysical production in support of human interests. This will be referred to as the functional ecosystem health aspect of sustainability.

4.5.2 Practical consequences – *second-order principles, buffer zones*

Westra (1994 p.183) says that a discussion of consequences that might follow from adopting the principle of integrity, should imply that no action can be moral that does not foster environmental or ecosystem integrity. Since the principle of integrity has no clear second-order principles that evidently follow from it, there is unfortunately, she says, no assurance that only one choice of action or policy would ensure or fit this requirement. Consequently, she says further, a ‘lot of deep thinking’ and analysis is left to the moral agent, because no ‘user’s rules’ come with it, and the extent of our obligation or required scale of integrity is not specified. Therefore, Westra (1998 p.24-25) suggests eight second-order principles to provide a bridge from the principle of integrity to actual conflicts and problems demanding resolution. Linked to this are notions of buffer zones.
Second-order principles – precautionary principle, ecological footprint, individual integrity

The first three second-order principles (Westra 1998 p.27) focus on the need for awareness about the complexities and uncertainties related to environmental and sustainability issues. They provide suggestions saying that policies should be designed to embrace complexity, judgements should be based on the post-normal science approach and activities should be limited by the precautionary principle. This points to the relevance both of the Ecological Element and the precautionary principle as part of the Sustainability Context, and also the relevance of the methodological ground of the present investigation. Second-order principles four and five (ibid. p.28) address sustainability more pragmatically by focusing on the world’s ecological carrying capacity. They say that we must reduce our ecological footprint and that it is imperative to eliminate many of our present practices, including rejecting technical maximality. This points in some way to the relevance of the role of science and the precautionary principle as part of the framework for the discussion of moral duties.

Second-order principle six (ibid. p.28) says that the essential meaning of the ethics of integrity is that it is necessary for humanity to learn to live as in a buffer and to respect and protect core wild areas. This means that we must view all activities as taking place in a buffer zone, Westra says. This sounds like it addresses the precautionary principle and the relevance of the Ecological Element.

In second-order principles seven and eight, Westra (ibid. p.46) explores the relation between individuals and wholes. Principle seven says that we on the micro level must respect the individual integrity of single organisms for their individual functions, but also on the macro level for their contribution to the whole. Second-order principle eight refers especially to the first three principles, which address uncertainties embedded in environmental and sustainability issues. It says further that we, due to the uncertainties, are responsible for not taking risks that might cause harm in the future, and that the potentials of individuals and the whole should be protected in the long term. This clearly points towards the Ecological Element again. When Westra in second-order principle seven says that we must respect the integrity of individuals, both for their individual functions and for their contribution to the systematic whole, it is not clear, I think, whether she refers to inner worth both of individuals and wholes. Her references to the respect for and the potentials of individuals and wholes at least point towards the research question of “Sustainability for whom?”.
**Buffer zones I – urban spread, healthy ecosystems, wild areas**

Westra (1998 p.138) elaborates especially about the idea of buffer zones and core wild areas mentioned in second-order principle six. She (1998 p.138) states that all human culture, activities and institutions should conform to the requirements of a buffer zone in relation to core or wild areas. There is a necessity, she (1994 p.183) argues, for areas or core zones where the primary sense of integrity must prevail, something which demands the establishment of boundaries for buffer zones where a less demanding sense of integrity, limited to healthy ecosystems, is necessary. Buffer zones can be said to have integrity, because the preservation of primary integrity in the core areas represent the criterion and standard of what is permissible in the buffer. The scale of urban spread or cultural centres that might be acceptable within or linked to buffer zones is unclear, she (ibid. p.185) says. Westra (1998 p.138) describes urban areas to be areas where little evolutionary processes persist. This is in contrast with areas of ecosystem health, where many evolutionary processes persist. Even areas that are entirely under the sway of culture and that are artefacts, she (1994 p.216) says, will also need to operate in a way that does not conflict with the two degrees of integrity.

If the central necessity is to protect wild areas in relatively sizable proportions, say 20 to 45 % of the earth’s surface, as areas of ecological integrity, then, according to Westra (1998 p.138), it is our obligation to dwell in the remaining 55 to 80 % in ways that produce no adverse impact upon these areas. We should recognise the necessity of leaving appropriately sized areas on both land and sea wild and unmanipulated, and limiting our intrusive practices upon the rest of the earth to whatever will not have an adverse impact on core wild areas, Westra concludes (ibid. p.95).

Several points must be taken into consideration, Westra (1994 p.185) says, with regard to what might be an acceptable scale of urban spread. Humans need sustainable and equally distributed food production, supporting both present and future generations. In addition, shelter and energy also fall under this heading. Hence, Westra concludes, cultural centres must be harmonious with integrity, both in the primary ecological and secondary health sense, rather than in conflict with them. The correct question, Westra (ibid. p.218) says, is then to ask how much urban culture is the minimum we can live with and, at the same time, the maximum the Earth can tolerate. This leads further to the question of the scale of the three area types, i.e. core, buffer and urban, and their relative proportions, which Westra (ibid.
p.216) sees as vitally important. Unfortunately, to answer these questions is precisely where scientific support fails, because no global or even national studies exist that can be used for guidance, she concludes.

**Buffer zones II – life support needs or full biological and cultural flourishing**

The question of how much urban culture is the minimum humans can live with might be, I think, interpreted in two ways. These are that the minimum urban culture humans can live with might either refer to basic life support needs for survival, growth and reproduction, or refer to needs for the fulfilment of humans’ biological and cultural flourishing potentials. In the first case the focus is probably on keeping as much as possible of areas wild at the expense of human cultural activities. In the context of Westra’s environmental ethics this might be interpreted to focus on structural ecosystem aspect of sustainability, and thus a care and respect for nature as a whole. In the other case the focus is more on the fulfilment of humans’ cultural needs and preferences at the expense of wild areas, but still balanced against the maximum the Earth can tolerate. Then the primary objective might be interpreted to be on functional ecosystem health aspect of sustainability as a basis to secure human biological and cultural flourishing.

A core question in relation to the buffer zones seems therefore to be whether they primarily should be established to secure the integrity of ecosystems as ends in themselves, as addressed by the research question of “Sustainability for whom?”, or if it is to secure the more instrumental valuations of ecological entities, as addressed by the research question of “Sustainability of what?”. To some extent it appears as though she in the theoretical elaborations primarily addresses “Sustainability for whom?”, while the practical considerations tend more towards “Sustainability of what?”. By the question of how much urban culture is the maximum of what the Earth can tolerate, Westra also addresses the role of science and the precautionary principle.

**4.5.3 International equity – universal survival, individual freedom and lifestyle**

By the notion of equally distributed food production, supporting both present and future generations, Westra addresses the Equity Principle. She (1994 p.201-202) holds that a holistic
approach is required, since concern with universal survival ought to come before individual preferences. By this, she (ibid. p.186) points out, there is one context within which the principle of integrity can be legitimately translated, namely into social and political action in an international global context. The principle cannot tell which social system is preferable, but it can show, she contends, ‘where and why international relations might be contravening its tenets’. The principle of integrity only issues a categorical imperative, she (ibid. p.205) says, when life-sustaining systems are in peril, and it does not arrogate to itself the right to dictate in other cases. Linked to this Westra (ibid. p.200) says that people’s ‘interdependence as coexisting entities on the same planet, and hence, as individuals who are totally dependent on the same life support systems, is primary’. She believes the principle of integrity to be appropriately foundational for an international justice taking the above into consideration. In summary she (ibid. p.201-202) states that the principle of integrity would be effective in two ways. First, it proposes a goal that is universally acceptable for the environmental standpoint. Second, it counsels respect for the basis of life.

In relation to international equity, she (ibid. p.202) says that there is nothing to prevent an individual in a less developed country from wanting desperately to enjoy not only freedom from famine and deprivation, but also parity with the lifestyle of more developed countries, with all their wasteful and unsafe practices. As serious concern with universal survival ought to come before individual preferences she emphasises that the principle of integrity’s ecological goal ought to govern international relations before all other preferences. This means, she says, that strong or basic rights ought to prevail before weak rights are considered. Westra (ibid. p.204) explains further that while still respecting individual cultural differences, viewpoints and groupings as embodied in separate nation-states, from the standpoint of the principle of integrity one would be required to take a universal stance that accepted global survival as primary. The crucial thing, she concludes, is whether or not the practices interfere with life support systems that support international equity.

By this I find that the focus on the Equity Principle in the Sustainability Context as a core part of the framework for the judgements of ethical records is strongly supported by Westra’s environmental ethics.
4.5.4 Intermediate summary – *philosophical approach*

This final intermediate summary will also be a summary of how the findings in the review might support the relevance of the Sustainability Context. This time two examples will be given additionally of certain topics that might help prepare the development of the conceptual model in the next chapter.

**Summary – relevance of the Sustainability Context**

Westra’s principle of integrity, with the distinction between structural and functional integrity, handles aspects of the values behind biodiversity that are closely linked with the two research questions of “Sustainability for whom?” and “Sustainability of what?” It therefore seems reasonable to say that the principle of integrity to a great extent supports the relevance of the Cultural Element of the Sustainability Context.

Westra’s philosophical approach to the sustainability questions also touches upon the Ecological Element. This is most explicitly addressed by the first six of Westra’s eight second-order principles. They touch upon almost the same issues as the UN-related approaches to the understanding of sustainability. This is when these second-order principles address topics such as complexity, post-normal science, precautionary principle, ecological footprint, elimination of present practises and buffer zones.

The relevance of the Harm Principle and Equity Principle as parts of the Sustainability Context should be well supported. This is not only because these principles, as described in Chapter 3 (Method – *a post-normal science approach*), were chosen because Westra emphasises that these principles are important in addition to the principle of integrity when dealing with policy options. The relevance is also supported by Westra’s focus on ecosystem health, life-sustaining systems and international equity.

**First example – three value perceptions**

The first example concerns the two aspects of sustainability, the structural ecosystem aspect and the functional ecosystem health aspect. These two aspects are to some extent linked with the two focuses on ecosystems mentioned in the first example of the intermediate summary of the biological approaches. These are the focus on evolutionary abilities and the focus on particular ecosystem services. As I see it, the structural ecosystem aspect is linked with the
focus on evolutionary abilities. This is such as when Westra in the first part of her definition of sustainability refers to an optimum undiminished capacity for sustained evolutionary development. This focus on evolutionary abilities can be interpreted in two ways. One is that the structural ecosystem aspect of sustainability represents an anthropocentric-related strong version of the precautionary principle in the sense that nature should be left almost undisturbed. What I think of here is Westra’s notion that the paradigm case of integrity lies in wild, largely undisturbed ecosystems. By this nature will play a role as a buffer to secure the long-term survival and flourishing of humans. The other interpretation is that Westra may see ecosystems as ends in themselves. This is when she says that ecosystem integrity represents an objective condition or an absolute value which reaches beyond the more culturally relative ecosystem health, and that the values that can be attributed to integrity are preliminarily nonanthropocentric.

Moving to Westra’s functional ecosystem health aspect of sustainability, this to some extent links with the focus on the particular ecosystem services mentioned in the biological approach. This is because the functional ecosystem health aspect is about sustainable biophysical production in support of human interests, and therefore, as I see it, represents an anthropocentric attitude. Westra addresses the legitimacy of an anthropocentric attitude as part of her ethics when she says that the wholeness of integrity represents both a natural and a cultural part. This should imply that cultural activities, and thus anthropocentric interests, are acknowledged. One question then is how humans might pursue and defend their cultural lives if large areas of nature should be kept wild. When Westra by the eight second-order principles tries to provide a platform for such practical considerations, she tends towards a relatively pronounced anthropocentric attitude. Further, when she in connection with the buffer zones discusses the scale of urban spread and cultural centres, she talks about a kind of trade-off between how much urban culture is the minimum humans can live with and how much is the maximum the Earth can tolerate. Strictly speaking, this then seems to boil down to a question of how humans value biodiversity as sources that can contribute both to their biological and cultural flourishing, and how to apply the precautionary principle to secure and protect the ecological entities and the ecosystem services that humans value.

From this I see three different value perceptions from Westra’s philosophical approach. These perceptions depend on how the structural ecosystem aspect of sustainability should be interpreted, and which of the functional and the structural aspects should gain priority. I am
assuming that the functional ecosystem health aspect of sustainability is in essence anthropocentric. For the interpretation of the structural ecosystem aspect of sustainability, the question is whether it is based on a belief that ecological entities primarily are ends in themselves or that they primarily play a role as buffers to secure the long-term survival and flourishing of humans. By ecosystems as ends in themselves I also, for the sake of the argument, include all kinds of ecological entities in this context.

Should the structural ecosystem aspect of sustainability be about ends in themselves, then this, as the first of the three value perceptions, represents a nonanthropocentric value perception that will have far reaching consequences for human activities. These are in the sense that the functional aspect will have low priority, and that the cultural parts of human flourishing probably have to be drastically restricted.

If, on the other hand, the structural ecosystem aspect of sustainability is more anthropocentric and about securing ecosystem services, then it, as mentioned, might be said to represent a strong version of the precautionary principle. Combining this with the functional ecosystem health aspect I believe a practical trade-off will be necessary between human cultural flourishing and what the Earth can tolerate. Should the functional aspect and human interests in such situations gain priority, then this represents the second value perceptions from Westra’s philosophical approach. The focus will then be on values behind biodiversity that support human biological and cultural flourishing, though within the limits of what the Earth can tolerate. This might be linked primarily with the focus on particular ecosystem services mentioned in the biological approach, though realising that some concern for the evolutionary abilities are also necessary.

Should instead, as the third value perceptions, the anthropocentric-related version of structural ecosystem aspect of sustainability gain priority before the functional aspect, then we have a situation where urban spread might be restricted by the strong version of the precautionary principle. The consequence of this might be that nature should be left almost undisturbed. This third value perception might then be more linked with the focus on evolutionary abilities than the focus on particular ecosystem services. Should the practical consequences of keeping areas wild be so substantial that there would be marginal possibilities of urban spread, then this might be said to represent an extreme version of the precautionary principle. The result might be substantial limitations on human cultural flourishing, maybe limited only to the
kinds based solely on pure admiration of nature in its undisturbed form. If so, there is a possibility that the practical consequences of this third value perception might be more or less equal with the practical consequences of the first-mentioned nonanthropocentric value perception.

In summary, these three value perceptions will be referred to as, on the one hand, one which builds on the nonanthropocentric structural ecosystem aspect of sustainability with focus on the evolutionary abilities, and two which are more anthropocentrically focused. These latter two are, firstly, the one which builds on the anthropocentric structural ecosystem aspect of sustainability, also with focus on the evolutionary abilities, and secondly, the one which builds on the anthropocentric functional ecosystem health aspect with focus more on the particular ecosystem services. In short, I sometimes refer to these two as the anthropocentric functional and structural ecosystem aspects of sustainability.

Second example – ecological literacy?
The second example of topics linked to the development of the conceptual model is what I refer to as ecological literacy. My ideas about ecological literacy are partly inspired by Westra’s saying that the reason why she puts emphasis on the whole rather than on individual components is in order to combat the extreme individualism prevalent in Western democratic societies. I interpret this to mean that Westra has an agenda behind her principle of integrity, which includes the need of creating a unified awareness and education about ecosystems as a whole. This means as a system which all individual components, whether humans or nonhumans, are dependent on. Such a unified awareness could be a kind of ecological literacy in the sense of basic ecological knowledge about the functions and structures of ecosystems, the complexity of these systems and the uncertainty with regard to their processes, added with a share of love, respect and care for nature. Ecological literacy might then further be seen as an element in the stage towards achieving a mutually acceptable value ground on which the global partnership idea mentioned in the review of the UN-related approaches might be built. This is like when Westra says that the principle of integrity would be effective by proposing a goal that is universally acceptable for the environmental standpoint and appropriately foundational for an international justice.

My use of the term “ecological literacy” is inspired by Callicott (1998a p.13-14) when he, linked to Leopold’s land ethics and ecological knowledge, says that a ‘universal ecological
literacy would trigger sympathy and fellow-feeling for fellow members of the biotic community and feelings of loyalty and patriotic regard for the community as a whole'.

Callicott says further that Leopold supports approaches to environmental ethics that are rooted in altruistic feelings like benevolence, sympathy and loyalty. I interpret this to mean that Leopold’s land ethics is based on two parts. One is an ecological knowledge part which triggers the other part consisting of sympathy, fellow-feeling and feelings of loyalty.

Building on this, I see that ethics might be based both on a knowledge part and a feeling part. I have therefore decided to use the term “ecological literacy” in the present investigation as a synthesis of both these parts. Though Callicott may think of ecological literacy as constituted by the knowledge part only, I prefer to see the feeling part that follows from or is triggered by knowledge as an integrated part of the ecological literacy. In the knowledge part, I will not only include scientific knowledge but also such as contact with and observations of nature. In the feeling part, which I hereafter refer to as the care part of the ecological literacy, I include such as the way humans love, respect and care for nature. The appearance of ecological literacy, or its attributes or characteristics, will then depend on the relative appearance of the knowledge part and the care part, but also on their total importance or extent. I perceive the knowledge part of ecological literacy primarily to have bearing on the Ecological Element of the Sustainability Context, while the care part probably has strongest bearing on the Cultural Element.

In summary, I understand ecological literacy to represent a potential basis for environmental ethics, and for attitudes and world views about nature in general. Such attitudes and world views might be like the three value perceptions mentioned above. These are those perceptions which build on the anthropocentric functional and structural ecosystem aspects of sustainability and the nonanthropocentric structural ecosystem aspect of sustainability.

The ecological literacy issues will be further elaborated and explained during the development of the conceptual model in the next chapter. This will be in connection with my practical interpretation of the selected philosophical theories of environmental ethics. These elaborations are about the appearance of the knowledge and care parts of ecological literacy, and how this might influence or be linked with the different attitudes, world views and ethics of the selected philosophical theories. I will not try to spell out some distinct connections or clear cause and effect relations between appearances of ecological literacy on one side and
different attitudes, world views or ethics on the other. My intention is more to provide some indication of what roles ecological literacy in general may play in philosophical theories of environmental ethics. Part of this is how ecological literacy may influence or result in value perceptions of the three kinds described on the basis of Westra’s philosophical approach. This is in the sense that ecological literacy firstly might contribute with a focus on particular ecosystem services and thus a value perception which builds on an anthropocentric functional ecosystem health aspect of sustainability. In pace with increased ecological literacy this might then shift to a greater focus on evolutionary abilities and thus move the value perception to build on an anthropocentric or a nonanthropocentric structural ecosystem aspect of sustainability.

4.6 The Sustainability Context – summary of relevance and support

The review of the UN-related approaches to the understanding of sustainability shows that there is a relatively broad representation of references that can be used in support of the Sustainability Context. The same is the case for the economic approaches. This appears to be so because the constraints proposed for modifications of traditional economics seem to build on the UN-related notes about sustainability. I also perceive Westra’s philosophical approach based on the principle of integrity to support the relevance of the Sustainability Context.

More questionable is to what extent biological science supports the relevance of the Sustainability Context. This is because there are uncertainties to whether stability has any real ecological meaning. Nonetheless, since the sustainability term is used in discussions of biological conservation, and since stability may occur temporarily and spatially in periods and specific areas, there should be some support to the relevance of sustainability as such, and thus the Sustainability Context.

My impression from the reviews is therefore that the Sustainability Context in general is supported, and thus should be regarded as relevant. This conclusion will be qualified in some more detail in the following. The review additionally shows that the discussions about sustainability to a great extent support the relevance of the three research questions of the present investigation.
4.6.1 The Cultural Element – relevance of two research questions

Despite some questioning, I conclude in the intermediate summary that the references in the review of the UN-related approaches generally seem to support the view that the Cultural Element is a relevant part of the Sustainability Context. One good reference summarising this, I think, is the first part of Lemons and Morgan’s synthesis of the concept of sustainability where they say that social and economic sustainability must be used to define acceptable measures to obtain equitable improvements in social and economic well-being.

Further, I also find that the UN-related approaches support the relevance of the two research questions of “Sustainability for whom?” and “Sustainability of what?”. This is by repeatedly addressing questions related to the values behind biodiversity.

The economic approaches and Westra’s philosophical approach to the sustainability questions also give general support to the relevance of the Cultural Element by addressing social constraints and cultural issues. Westra addresses also more specifically questions that support the relevance of the two research questions.

From the review of the biological approaches it may be concluded that biological science is more or less value-laden, and should therefore take values into consideration when prioritising activities and disclose the value bases of scientific activities. This points also towards the relevance of the Cultural Element, including the two research questions.

4.6.2 The Ecological Element – role of science and the precautionary principle

Support to the relevance of the Ecological Element is found in all the four approaches to the sustainability question. They all show references that in different ways address the need to be aware of the complexities of ecosystems and the uncertainty with regard to their processes. This is especially addressed in the biological approaches. I think here specifically of the addressed lack of stability and equilibrium of ecological systems, and the weak predicting power of these systems.
Further, the UN-related approaches seem to support that it is relevant to associate both the role of science and the precautionary principle with the connection between the Ecological Element and the Cultural Element. NENT says, as an example, that the precautionary principle is the principle related to sustainable development that has greatest importance for scientific activity and methods, and COMEST says that scientific analysis should be ongoing so that chosen actions are subjected to review, and that the choice of actions should be the result of a participatory process. The economic and the philosophical approaches also address these issues, with special focus on the precautionary principle.

With this and the recognition that some degree of stability and thus sustainability may occur despite the uncertainties with regard to ecosystem processes, I found that a reasonable conclusion about the role of science is a continual effort to search for knowledge both of what we know and what we do not know about ecosystems. Linked to this it should be mentioned that despite the debate about the role of science because it is value-laden and has limitations to its predictive capability, it is maintained that scientists have made important contributions to the understanding of environmental problems. Essential in this connection is that science needs to take into consideration the value grounds of the societies when producing and delivering biological knowledge. The review of functional groups and species redundancy demonstrates that biological science, specifically when it focuses on ecosystem goods and services, but also when it has a more strictly scientific focus, is more or less value-laden. It is therefore said that the value bases of scientific activities need to be disclosed and that a scientist’s personal values should not be confused with the scientist’s empirical work. Weiner warns in this connection against privileged knowledge and says that it is important when appealing to science to be explicit about underlying moral and political agendas, while Robertson and Hull warns against an attitude among environmental scientists saying that things would be better if only we could educate the public. This links, I say, to my concern with regard to avoid buzzwords and the risk that mixing of biological facts and values might be detrimental to an upright and honest debate or discourse in the field of the environment.

4.6.3 The Ethical Element – the Harm Principle and the Equity Principle

The Ethical Element, with the adjacent Harm Principle and Equity Principle, is in different ways supported by the review. The probably best support for the Ethical Element in general as
a part of the Sustainability Context is when Perman et al. say that arguments of sustainability are intrinsically ethical in nature.

The relevance of the Harm Principle and Equity Principle as parts of the Sustainability Context should be well supported by Westra, since she specifically emphasises that these principles are important in addition to the principle of integrity when dealing with policy options. This is also supported by the UN-related approaches both by generally addressing fairness in distribution of and access to values behind biodiversity, and by NENT and COMEST in connection with their focus on the precautionary principle.

Though there is a great number of unresolved questions about how or to what extent substitutability can be used as a mechanism in relation to judgements of ethical records, I think that the relevance of the substitutability part of the Equity Principle also is reasonably well supported.

It should also be mentioned that the above supports the reasonableness and relevance of my suggested answer to the research question about moral duties where I say that avoidance of harm and securing of equity are central.

4.6.4 Methodological ground – *post-normal science approach*

It should be noted that the methodological ground of the present investigation is perceived to be supported by the UN-related, the economic and the philosophical approaches. This is by their references to post-normal science, participatory processes, the global partnership idea and the social constraints to economy motivated by value perceptions and participation.

4.6.5 Ecological literacy – *role of science*

Lastly, a few comments will be made about ecological literacy and also the role of science in this connection. This is because the ecological literacy issues, as mentioned in the intermediate summary to Westra’s philosophical approach, will be further elaborated and explained during the development of the conceptual model, specifically in relation to my practical interpretations of the philosophical theories of environmental ethics. In this
connection I say that ecological literacy may be a basis for attitudes, world views and ethics in the field of the environment.

**Mind photo 4.2** The Sustainability Context – *main elements, added with ecological literacy*

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**The Sustainability Context – *main elements***

**The Ethical Element**

*Ethical records:*
Moral duties in relation to impacts on moral stakeholders’ needs and preferences

---

*Fair distribution*  
*Substitutability*  

**The Equity Principle**

*No-harm*  
*Quality*  

**The Harm Principle**

---

**The Ecological Element**

*Knowledge base:*
Awareness of ecosystem complexities and uncertainties

---

*Ecological literacy*  
*Role of science*  
*Precautionary principle*  

**The Cultural Element**

*Values behind biodiversity:*
“Sustainability for whom?”: Moral stakeholder status of ecological entities  
“Sustainability of what?”: Biological and cultural flourishing

---

I have therefore decided to add “Ecological literacy” to the description of the Sustainability Context. Since ecological literacy represents a synthesis of the knowledge and care parts, I have in mind photo 4.2 indicated this by linking it with the Ecological Element and the Cultural Element. This is in the sense that the contact, observation and knowledge part of ecological literacy primarily has bearing on the Ecological Element, as explained in the intermediate summary to Westra’s philosophical approach, while the love, respect and care part probably has strongest bearing on the Cultural Element. The knowledge part is therefore
much about the complexities of ecosystems and the uncertainty with regard to their processes. The care part, which follows from or is triggered by the knowledge part, is more about needed and preferred values behind biodiversity.

The role of science in relation to this will, as also shown in mind photo 4.2, be seen as a two-way connection between the Ecological Element and the Cultural Element. One is, as described originally, to increase the knowledge base of the Ecological Element on the basis of the value perceptions of the Cultural Element. The other, which is added by the introduction of ecological literacy, is that the knowledge base might influence the value perceptions of the Cultural Element.
5. The conceptual model – a primary goal

The development of the conceptual model is a primary goal of the present investigation, I say, because of the need for a tool to help identify possible value grounds for ethical environmental accounting. For this purpose the conceptual model is intended to help identify moral stakeholders, values behind biodiversity and moral duties related to such values.

The conceptual model has, as mentioned in Chapter 3 (Method – a post-normal science approach) two main parts. One part is the inner worth table, which is meant to handle the research question “Sustainability for whom?”. This is the part of the model that will be handled in present chapter. It should be recalled that the main purpose of the inner worth table is to distinguish between ecological entities that have a universal inner worth from those that have not, and thus are purely instrumental or have particular inner worth only. The other part of the conceptual model is the flourishing matrix, which was already developed and explained in Chapter 3 (Method – a post-normal science approach).

It should also be recalled that the model is termed conceptual because it is seen as a kind of frame or structure for how such models can be developed and constructed. This is done so because it is practically impossible within the limits of the present investigation to cover all different kinds of philosophical theories about environmental ethics that might have relevance for the research questions of “Sustainability for whom?” and “Sustainability of what?”. The conceptual model should therefore be seen as a suggestion of how such theories might be handled more than a completely developed tool kit.

Despite my critical comments to the use of buzzwords such as intrinsic value, inherent value and integrity, the reader should be aware that I need to use such words when commenting on references where these words are used. The aim is to try to disclose how to understand these words and the different references in relation to moral stakeholder status, values behind biodiversity and moral duties.
5.1 Development of an inner worth table – main steps

The development of the inner worth table is organised in four subchapters covering different kinds of selected philosophical theories of environmental ethics. These are anthropocentric theories characterised as strong and weak ethics, and nonanthropocentric theories characterised as biocentric and ecocentric ethics. Short descriptions of the characteristics of these theories are given in the following section. Included here is a description of how the subchapters are ordered. Thereafter, before the subchapters covering the philosophical theories, is a section with descriptions of how the four subchapters are structured.

5.1.1 Philosophical theories about environmental ethics – anthropocentric and nonanthropocentric

Armstrong and Botzler (1993 p.275-276) say that anthropocentrism is the philosophical perspective asserting that ethical principles apply to humans only, and that human needs and interests are of highest, and even exclusive, value and importance. With reference to Norton\(^{12}\) (1984) they say that it can be differentiated between weak and strong anthropocentric ethics. Strong anthropocentric ethics is characterised by the notion that nonhumans and natural objects have value only to the extent that they satisfy human desires. Norton refers to this as a felt preference, which involves fulfilment of human desire whether or not it is based on thought and reflection. Weak anthropocentric ethics is distinguished from strong by the affirmation that nonhumans and natural objects can, in addition to felt preference, satisfy what Norton refers to as considered preference. A considered preference, Norton (1984 p.133-134) explains, is a human desire or need which is based on careful deliberation, and is compatible with a rationally adopted world view, a metaphysical framework interpreting these theories, and a set of rationally supported aesthetic and moral ideals. Weak anthropocentric ethics value therefore nonhuman entities for more than their use in meeting unreflective human needs, Armstrong and Botzler (1993 p.276) says. This means that nonhuman entities are valued for enriching the human experience.

\(^{12}\) Note that Armstrong and Botzler (1993) refer to Norton (1984) in two different ways: one way in the text (p.275), where “Contemporary Expressions of Anthropocentrism” is added to the title of Norton’s article, and another way in the reference list (p.569), where the subtitle to section II in Norton’s article is used instead of the article’s main title.
The nonanthropocentric philosophical theories I have decided to split, like Pojman (2001 p.75) does, into individualistic biocentric ethics and holistic ecocentric ethics. The biocentric philosophical theories focus on criteria for direct moral status value of individual ecological entities. Callicott (1998a p.12-13) says that biocentric ethics provide variations on the standard paradigm of traditional anthropocentric moral philosophy by their choice of properties that entitle the possessors to moral considerability. Compared with the ecocentric ethics, Callicott (2002 p.8) contends that biocentric approaches face the challenge that they too narrowly distribute intrinsic value to individual organisms only, and therefore do not provide moral considerability to supra-individual ecological entities like species, populations, communities or ecosystems. This is what the ecocentric ethics does. The ecocentric philosophical theories are holistic, Pojman (2001 p.75) says, because they view the biosphere as a totality, including species, populations, land and ecosystems. They also include concern for air and water quality, soil stability and ozone layer restoration (Callicott 2002 p.8). Attempts are made, Callicott (1998a p.13) says, to attribute unconscious interests to such environmental wholes.

**Five subchapters – strong and weak anthropocentrism, biocentrism, ecocentrism and main conclusions**

On this basis then, the first subchapter handling the philosophical theories is about strong anthropocentric ethics with focus on traditional Western anthropocentric ethics. The next subchapter is about biocentric ethics, which involves animal welfare, animal rights and life-centred ethics. Then follows ecocentric ethics, with sections about holistic approaches, deep ecology and an ecological integrity approach. The last subchapter about weak anthropocentric ethics, contains some Kant-related ethical reflections, and four contemporary anthropocentric positions. Some concluding remarks with regard to the development of the conceptual model are given in the final subchapter.

**5.1.2 The subchapters’ structure – value-conferring properties, side comments**

The different kinds of philosophical theories of environmental ethics are discussed in separate sections within each subchapter. The following summaries are given at the end of each section:
**Value-conferring properties – direct moral status value**

A conclusion will be drawn regarding possible value-conferring properties that might be used to ascribe a direct moral status value that might qualify for a moral stakeholder status. This means basically to identify value-conferring properties that pertain to ecological entities that might have a universal inner worth. The conclusions about value-conferring properties represent the core input necessary for the development of the inner worth table.

**Side comments – related topics**

In the discussion of the different philosophical theories of environmental ethics there will also be brought up topics related to the inner worth table that are not about value-conferring properties directly. These are topics that in different ways address the relevance of the conceptual model, issues for the judgements of ethical records in the case study, and issues related to ecological literacy, as described in the following:

**Side comments – relevance of the conceptual model**

Side comments addressing the relevance of the idea behind the conceptual model are primarily about issues linked with the research questions “Sustainability for whom?” and “Sustainability of what?”.

**Side comments – issues for the judgements of ethical records**

Side comments addressing issues of relevance for the judgements of ethical records in the case study are about issues linked with the framework for the judgements of ethical records described in the Sustainability Context.

**Side comments – issues related to ecological literacy**

Side comments addressing issues related to ecological literacy. The focus of these side comments are explained in the following.

**Ecological literacy – topic appearing during the development of the conceptual model**

Among the three side comments I regard ecological literacy to be of special interest. This is because it plays a specific role in my practical interpretation of the selected philosophical theories, as shown through the development of the inner worth table.
It should be recalled from Chapter 4 (Sustainability Context – contemporary perceptions) that I describe ecological literacy as representing a synthesis of a knowledge part and a care part. The knowledge part is about contact with, observations of and knowledge about ecological entities. This has bearing on the Ecological Element of the Sustainability Context by supporting knowledge about the complexities of ecosystems and the uncertainty with regard to their processes. The care part, which follows from or is triggered by the knowledge part, is about the way humans love, respect and care for nature. This has bearing on the Cultural Element in the sense that it contributes to what is perceived as needed and preferred values behind biodiversity. I also say that ecological literacy, as a synthesis of the knowledge part and the care part, might be a basis for attitudes, world views and ethics in the field of the environment.

The side comments of issues related to ecological literacy are split into three parts. First, under the heading of “Ecological literacy”, are comments about how I perceive ecological literacy to be part of or to influence the different attitudes, world views and ethics of the philosophical theories discussed. It should be recalled that I in the practical interpretation of these philosophical theories include elaborations of the appearance of the knowledge and care parts of ecological literacy, and their total importance or extent. As mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), I will, however, not try to spell out some distinct connections or clear cause and effect relations between appearances of ecological literacy on one side and different attitudes, world views or ethics on the other. My intention is more to give some indication of what roles ecological literacy in general may play in philosophical theories of environmental ethics.

Second, under the heading of “Supra-individual ecological entities”, comments are presented about whether and how I perceive that supra-individual ecological entities are described or might be perceived as representing support systems to secure needed and preferred values behind biodiversity. This means that I will describe how I perceive the value perceptions of the different philosophical theories to fit with the three value perceptions from Westra’s philosophical approach, mentioned in Chapter 4 (Sustainability Context – contemporary perceptions). These, it should be recalled, build on the nonanthropocentric structural ecosystem aspect of sustainability and the two more anthropocentric aspects of sustainability represented by the functional ecosystem health aspect with focus on the particular ecosystem services, and the structural ecosystem aspect with focus on the evolutionary abilities.
I perceive, as described in Chapter 4 (Sustainability Context – contemporary perceptions), the three value perceptions in various degrees to be influenced by ecological literacy. This is in the sense that ecological literacy firstly might contribute with a focus on particular ecosystem services and thus a value perception which builds on an anthropocentric functional ecosystem health aspect of sustainability. In pace with increased ecological literacy, this might shift to a greater focus on evolutionary abilities and thus move the value perception to build on an anthropocentric or a nonanthropocentric structural ecosystem aspect of sustainability.

The third part, which will be handled under the heading of “Role of science”, is about the role of science in creating the knowledge part for ecological literacy, but also in contributing to create love, respect and care for nature in the two-way connection between the Ecological Element and the Cultural Element of the Sustainability Context. Ultimately this means the role of science in building or creating both the knowledge and the care parts of ecological literacy as a basis for attitudes, world views and ethics in the field of the environment.

5.2 Strong anthropocentric ethics – human interests of highest value

The roots of Western anthropocentric ethics can be traced back at least to the time of Mesopotamia about 5,000 BC (Hughes 1975 p.33). It is found in Genesis, among ancient Greek and Roman philosophers, such as Plato, Aristotle and the Stoics, in the Western Church by philosophers such as St. Augustine and St. Thomas Aquinas, and by secular philosophers such as René Descartes and Immanuel Kant (Armstrong and Botzler 1993 p.275-276, Pojman 2001 p.10, Wetlesen 1999 p.287-288, 296). Though the present investigation primarily builds on ethical approaches in secular philosophy, some references to early Western religious philosophy cannot be avoided. This is both because the Western Church to a great extent has influenced the thinking of people in the Western world and because there up through history have to varying degrees been links between religious and secular Western philosophy (Armstrong and Botzler 1993 p.164-166).
5.2.1 Strong anthropocentric ethics – *religious and secular philosophy*

The first subsection in the presentation of strong anthropocentric ethics starts with some references to Genesis, and continues with references to Aristotle, Augustine, Aquinas and Descartes. Augustine and Aquinas represent religious philosophy, while Aristotle and Descartes represent the more secular philosophy (Lübcke 1995). The second subsection is entirely devoted to Kant’s philosophy and his anthropocentric ethics. The last two subsections contain the discussion of value-conferring properties and the side comments.

**Anthropocentric ethics preceding Kant – from Genesis to Descartes**

Starting with Genesis, the passage about the Creation in Genesis 1:28 where Adam and Eve are told to fill the earth and conquer it, and to be masters of all living animals on earth, are often cited as the root of anthropocentrism in Western Christianity (Pojman 2001 p.10). So is also the passage in Genesis 1:26, when God, before he created man, said that man should have ‘dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth’ (Regan and Singer 1989 p.1). Even Noah and his sons were told the same in Genesis 9:3. God said to Noah that ‘every moving thing that lives shall be food for you; and as I gave you the green plants, I give you everything’ (ibid. p.2).

Aristotle (384-322 BC) says it is evident that animals are created for the sake of humans and that all the things in nature that humans utilise are there for that purpose. Aristotle makes this conclusion after a discussion about excellence, where he states that some should govern and some should be governed (Clarke and Linzey 1990 p.56-58). Aristotle says further that the gift of speech proves that humans are more social than bees and that humans differ from other animals because they alone have a perception of good and evil, and of just and unjust (ibid. p.6). This gives a natural impetus for humans to associate with each other and create civil societies. The completion of this, according to Aristotle, ultimately makes humans the most excellent of all living beings (ibid. p.7).

The first of the two religious philosophers, Augustine (AD 354-430), discusses whether humans are allowed to kill animals and to pull flowers. He does so with reference to the commandment ‘Thou shalt not kill’. His conclusion about this, which he makes with reference to the Creation, is that the commandment is about humans only. Augustine says that animals
are ‘by the just appointment of the Creator subjected to us to kill or keep alive for our own uses’. As an additional argument, he says that the commandment neither should be understood to include plants, since they have no sensation, nor to include irrational animals, since they are dissociated from humans by their lack of reason (Augustine 1993 p.26).

Aquinas (1225-1272) argues along the same lines. With reference to Augustine’s statement above, Aquinas says that ‘it is not unlawful if man use […] animals for the good of man’ and that ‘the order of things is such that the imperfect are for the perfect’ (Clarke and Linzey 1990 p.102-103). Aquinas is strongly influenced by Aristotle. Their thinking is often referred to as the Aristotelian-Thomist tradition (ibid. p.xiv). This, according to Clarke and Linzey, is especially when Aquinas emphasises the rationality of humanity as the key distinguishing mark in separating the human and nonhuman worlds. Aquinas holds that rationality is what determines the excellence of a thing, with God viewed as pure intellect and hence perfect (Armstrong and Botzler 1993 p.278). He says that it is in virtue of reason that humans resemble God and are put in the privileged class (Saugstad 1994 p.1). Aquinas believes that only humans possess intellects on earth, and that the remainder of God’s earthly creation is under human domain (Armstrong and Botzler 1993 p.278). As a consequence of this he concludes that animals ‘by the divine providence […] are intended for man’s use according to the order of nature’, and claims thereby to have refuted the error of those who says that it is sinful for a man to kill brute animals (Clarke and Linzey 1990 p.10). However, Aquinas warns against being cruel to animals, when he says that ‘lest through being cruel to animals one become cruel to humans beings’ (ibid. p.10).

The last of the strong anthropocentric philosophers preceding Kant I will mention is Descartes (1596-1650), who also argues that humans are distinctly different from animals and the rest of the natural world. Descartes concludes that animals can be viewed as machines (Armstrong and Botzler 1993 p.281). He says that there are two very certain tests by which to recognise that a machine which resembles a human body is not real human. The first is if the machine can speak and the other is if it has a rational mind. He claims clearly that animals, just like machines, are unable to speak, though some parrots might be able to utter some words. Regarding rationality, Descartes (ibid. p.281) says that animals not merely have less reason than humans, but that they have none at all. ‘It is nature which acts in them according to the disposition of their organs, just as a clock’, he asserts (ibid. p.282). Armstrong and Botzler say
that based on Descartes’ rationale it should be concluded that humans have little responsibility to animals, unless the treatment of them affects other humans (ibid. p.281).

Summing up the strong anthropocentric thinking preceding Kant, it seems to be a prevailing attitude that humans are superior to nature, and that this superiority is primarily linked to rationality, linguistic competence and perceptions of good and evil. It follows from this that humans are allowed to utilise nature for their own purpose, and as such have no direct moral duties to any ecological entities, whether these are animals, plants or other nonhuman living organisms. It seems therefore that Armstrong and Botzler (1993 p.275) are right in their description of anthropocentrism as a philosophy that asserts ethical principles to humans only.

**Kant – means to an end versus an end in itself**

According to Saugstad (1994 p.1), Kant (1724-1804) follows the strong anthropocentric thinking of holding that humans enjoy a privileged moral status as compared to the animals and all other entities on earth. Kant argues that rational nature, defined by free will, is that in virtue of which we are persons and as such subjects of human worth (ibid. p.1). The capacity to act contrary to all natural feelings is what Kant says is required to be a moral person, and this capacity is free will (ibid. p.7). Saugstad (1993 p.159) says that ordinary morality, according to Kant, contains a fundamental distinction between persons, who are never to be treated simply as means to ends but always also as ends in themselves, and things, which we are entitled to use simply as means. Kant holds in this connection that it is the capacity for morality, the free will, which elevates man above things (ibid. p.159). Morality dictates, Saugstad explains further, that man and every other rational being, as Kant (1785 p.37) expresses it, must necessarily regard his own existence according to the principle that ‘the rational nature exists as an end in itself’. More specifically, Saugstad (1993 p.159) says, respect for the moral law picks out rational nature, defined by free will, as the person-constituting property. As a summary of Kant’s view on this, Saugstad (ibid. p.160) refers to what he calls Kant’s ‘celebrated formula of humanity’, which says:

‘So act as to use humanity, whether in your own person or in the person of any other, always at the same time as an end, never merely as a means’. (Kant 1785 p.38)
Pojman’s (2001 p.31) comment to this is that rational beings according to Kant are ends in themselves and must never be used as mere means, and that only they have intrinsic moral worth. Armstrong and Botzler (1993 p.285) say that Kant asserts that only rational beings merit moral concern, and believes that for a rational being, rationality has intrinsic value, and thus is a goal worth seeking in itself.

When discussing the moral status of animals and other nonhuman entities, Kant says that non-rational beings only have relative value as means, and therefore are called things. He says further that ‘animals are not self-conscious and are there merely as a means to an end’ (Pojman 2001 p.32). Pojman (ibid. p.31) interprets this to mean that animals cannot be persons because they are not rational, self-conscious beings, and therefore not capable of grasping the moral law. Similarly, Armstrong and Botzler (1993 p.285) say that animals and other nonhuman natural entities do not, according to Kant, merit moral concern since they are not rational. Saugstad (1993 p.159-160) understands Kant’s position regarding animals to be that while all rational beings, whether they are humans or not, are persons, animals are things because they lack a rational nature, although they are the object of other kinds of emotions, such as love and fear. Kant concludes, according to Clarke and Linzey (1990 p.127), that ‘our duties towards animals, then, are indirect duties towards mankind’, which should mean, Armstrong and Botzler (1993 p.285) say, that human beings according to Kant have little or no responsibility towards animals and the natural world.

Finally, it is worth mentioning that Kant, as Aquinas, warns against being cruel to animals, because ‘he who is cruel to animals becomes hard also in his dealing with men’ (Clarke and Linzey 1990 p.126). Kant says that if a man acts badly towards a dog, he does not fail in his duty to the dog, ‘but his act is inhuman and damages in himself that humanity which it is his duty to show towards mankind’ (ibid. p.126). Kant even advises humans to be in contact with and learn from animals because ‘[t]he more we come in contact with animals and observe their behaviour, the more we love them, for we see how great is their care for their young’ (ibid. p.126). Pojman (2001 p.31) understands Kant to mean that we do not owe animals anything. But, still, we should be kind to them since that will help develop good character in us and help us treat our fellow human beings with greater consideration.
Value-conferring properties – *rationality*

Based on the above description of the philosophical thinking from Aristotle via Augustine, Aquinas and Descartes to Kant, I find it reasonable to conclude that strong anthropocentric ethics is rooted in the view that rationality is the value-conferring property that morally distinguishes humans from animals and other ecological entities. It seems that these philosophers have taken for granted that only humans have the capacity of reason. Rationality and reason, linked with language and free will, are further said to be the properties that give humans the status as ends in themselves. Wetlesen (1999 p.296) supports this conclusion when he says that the philosophers mentioned above ground moral status in the capacity of reason, language and free will.

Using the terminology selected for present investigation, this could be expressed as saying that rationality according to strong anthropocentric ethics is a necessary and sufficient value-conferring property for ascribing a direct moral status value that qualifies for moral stakeholder status. To what extent some ecological entities, such as higher order mammals, also might qualify for a moral stakeholder status value on the basis of some degree of rationality, will be discussed in a later section.

**Mind photo 5.1 Inner worth table – *strong anthropocentric ethics***

<table>
<thead>
<tr>
<th>Ethical position</th>
<th>Traditional inter-human ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Proposed value-conferring property</em></td>
<td><em>Rationality</em></td>
</tr>
<tr>
<td>Ecological entities with possible universal inner worth, Life domain</td>
<td>None</td>
</tr>
<tr>
<td>Direct moral status value that might qualify for moral stakeholder status</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems</td>
</tr>
<tr>
<td>or no universal inner worth, but particular inner worth, Cultural domain</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems</td>
</tr>
<tr>
<td>Recreational values</td>
<td></td>
</tr>
<tr>
<td>Aesthetic values</td>
<td></td>
</tr>
<tr>
<td>Scientific values</td>
<td></td>
</tr>
<tr>
<td>Evolutionary values</td>
<td></td>
</tr>
<tr>
<td>Symbolic values</td>
<td></td>
</tr>
<tr>
<td>Religious values</td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value Biological domain</td>
<td>Same as above</td>
</tr>
<tr>
<td>Life support values</td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
</tr>
<tr>
<td>Economic values</td>
<td></td>
</tr>
</tbody>
</table>
With this, the first part of the development of the inner worth table can be established as shown in mind photo 5.1.

With rationality as the value-conferring property, the inner worth table shows that no ecological entities, according to the strong anthropocentric ethics, have a universal inner worth. This means that they are not ascribed a direct moral status value that might qualify for moral stakeholder status. For ecological entities, such as mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities, it is noted that they might have a kind of particular inner worth or be of purely instrumental value. Though only individual ecological entities are primarily mentioned and discussed among the strong anthropocentric ethics philosophers, it is presumed that they would agree that neither do supra-individual ecological entities have the capacity for reason. Any ethical considerations will then according to strong anthropocentric ethics be about humans’ needs and preferences only. This therefore represents an ethical position I have decided to refer to as traditional inter-human ethics. The row in the inner worth table indicating possible degrees of direct moral status value will be included later.

**Side comments to strong anthropocentric ethics – relevance of the conceptual model**

I have one side comment to the strong anthropocentric ethics related to the relevance of the conceptual model. This is about perceptions of possible ecological crisis in relation to needed and preferred valued behind biodiversity.

**Ecological crisis – caused by anthropocentrism?**

Some authors have accused strong anthropocentric ethics for having an attitude of little awareness for the values behind biodiversity and not really to care about the status of nature. White (1967 p.1205-1207) is an exponent of such a view. He contends that the world is facing an ecological crisis which is primarily due to the strong anthropocentric attitude. White characterises this as ‘the orthodox Christian arrogance towards nature’. In response to this contention, Moncrief (1970 p.510) points out that human beings have been altering the environment from their beginning. He (ibid. p.511) states that the causes of the ecological crisis are complex and have to do with the natures of capitalism, technology, democratisation, urbanisation and individualism. He also asks that if it is so that the environmental crisis is due to Christian arrogance, why do other parts of the world, outside the Western Christian domain, also experience the same environmental problems. Another response to White’s
contention is given by Dobel. He maintains that the Christian attitude is an ethics of stewardship, and that ‘humility towards God regarding nature, not arrogance, is enjoined by our religious heritage’ (Dobel 2001 p.24).

The above comments on whether the contended ecological crisis is primarily due to the anthropocentric attitude, address two questions which are too broad and complicated for handling within the frames of the present investigation, and one that will be handled. The first broad question is whether strong anthropocentrism, as White contends, creates a negligent attitude towards nature, one that results in an ecological crisis. The other is whether, as Moncrief and Dobel assert, a caring attitude towards nature is independent of ethical positions, whether anthropocentric or not. The third question, which will be handled, is to what extent preferences regarding the values behind biodiversity might be decisive for the perception of whether there is an ecological crisis or not. This is related to the research question of “Sustainability of what?” and is linked with Moncrief’s statement that capitalism, technology, democratisation, urbanisation and individualism might be causes of the ecological crisis. Since people have different preferences and different needs for how to achieve their biological and cultural flourishing, and thus have different perceptions of the values behind biodiversity, there are reasons to believe that this is decisive for their perceptions of ecological crises. As described in Chapter 1 (Introduction – research area), this might be in the sense that some prefer cultural entities such as cars, roads, shopping centres and coffee bars, or sculptures, theatres and sports arenas, before natural wilderness, even if it should result in more rain and storms due to climate change. As an example of such different perceptions, it is mentioned in Chapter 4 (Sustainability Context – contemporary perceptions) that Lomborg (2001), opposed to for example the UN reports, rebuts that we have an ecological crisis. He states rather that we are not overexploiting our renewable natural resources, and that our societies certainly seem to be sustainable. One indication that this might be due to different value grounds is Lomborg’s statement that we have to realise that improving the environment is only one of the many ways to invest in a better world. We must, he says, prioritise the environment as against better education, more health care and better infrastructure. Though the UN reports also address the importance of fulfilling human needs and preferences, it seems that Lomborg is willing to sacrifice more of the natural environment to create other values.
If it is so that different needs and preferences with regard to values behind biodiversity in this way might represent different ethical attitudes, this supports the relevance of the conceptual model. This is just because revealing such attitude differences is what the conceptual model basically is about. Further, also linked to this, is the question of how needs and preferences with regard to values behind biodiversity might be influenced by knowledge about biodiversity and ecological literacy in general. This is addressed in the next side comment.

Side comments to strong anthropocentric ethics – issues related to ecological literacy
A second side comment to the strong anthropocentric ethics is linked to ecological literacy. This is about the knowledge and care parts of ecological literacy and the relation between animals and humanity.

Ecological literacy – observation as bases for attitude of love
This side comment is about the warnings against being cruel to animals. One of the anthropocentric arguments mentioned is that we should not be cruel to animals because that might damage humanity. Another is that we should be kind to animals since that will develop good character in us and help us treat our fellow human beings with greater consideration. Though the main motivation is to create a good attitude for the relations between humans, it in practice also is said to create an attitude of not being cruel to animals. This is such as when Kant holds that the more we come in contact with animals and observe their behaviour, the more we love them.

In the context of ecological literacy I perceive the references about contact with animals and observation of their behaviour as representing the knowledge part, while the way we love them represents the care part. The synthesis of these parts is then a kind of ecological literacy that in practice should create a basis for the attitude of not being cruel to animals. This might then be seen as an ecological literacy with special bearing on the Cultural Element. The further consequence of this might be that this creates an attitude of love, respect and care which has influence on valuations within the particular inner worth value category. This means a valuation of animals, and for that sake ecological entities in general, as more than purely instrumental, but still not to have a universal inner worth.
Supra-individual ecological entities – *anthropocentric aspects of sustainability*

Though the references related to ecological literacy are restricted to contact with and love to animals, it should be reasonable, I believe, to think that these references would apply in relation to supra-individual ecological entities also. This means that contact with and observation of nature in general would make that we would love not only animals, but also supra-individual ecological entities, such as specific species, populations, habitats or ecosystems. Relating this further to the three value perceptions about sustainability, I believe, that ecological literacy if added to strong anthropocentric ethics might create a focus at least on particular ecosystem services. The result would then be a perception that tends towards the anthropocentric functional ecosystem health aspect of sustainability. Further, with increased contact with, observation of and knowledge about nature, the focus might turn more towards evolutionary abilities and thus a perception that tends towards the anthropocentric structural ecosystem aspect of sustainability. Though this might be a possible scenario in the context of strong anthropocentric ethics, a steady increase in ecological literacy would logically never end, I believe, with a perception that accepts the nonanthropocentric structural ecosystem aspect of sustainability.

5.3 Biocentric ethics – *individual ecological entities are ends in themselves*

On the basis of the relatively plain and clear-cut description of strong anthropocentric ethics, the next step goes into the more complex and variable ethical views found in the broad range of nonanthropocentric positions. This starts with the biocentric ethics and individualistic approaches of four authors. The first Peter Singer, argues for the liberation of animals and that at least some kinds of animals should be given moral considerations (Pojman 2001 p.33). The next is Tom Regan, who is critical of Singer’s animal liberation ethics, and instead postulates the existence of animal rights (Regan 1980 p.112). The third author, Kenneth E. Goodpaster, goes a step further to a moral philosophy beyond animal liberation and animal rights into what is called environmental ethics proper (Callicott 1998a p.11). He argues for an ethics where possessing life makes a being morally considerable (Pojman 2001 p.112). It is the reference here to environmental ethics proper which has inspired me to use the term “proper environmental ethical position” when addressing, as I say in Chapter 3 (Method – *a post-normal science approach*), various ethics that have similarities with what Rolston (1988 p.1-
2) refers to as primary environmental ethics. The fourth author, Paul W. Taylor, agrees with Goodpaster that all living things have interests and thus are a good of their own, but proffers a much stronger version of biocentrism (Callicott 1998a p.11). He introduces the concept of teleological centres of life, which involves the view that humans are members of the earth’s living community and not inherently superior to other living things (Armstrong and Botzler 1993 p.353).

The reader will notice that the number of pages used to discuss the ethical theories of Regan and Taylor are double of what is used for Singer and Goodpaster. One reason for this is that Singer and Goodpaster refer to relatively straightforward terms, such as sentience and being alive, while Regan and Taylor use terms such as inherent value, intrinsic value and teleological centre of life, which I think are more in need of clarification. These are terms similar to the buzzwords mentioned in Chapter 1 (Introduction – research area). Another reason is that more space is needed to explain the practical limitations of Regan’s and Taylor’s theories and the adjustments necessary for practically implementing them.

5.3.1 Singer – animal liberation

Singer (1998 p.26) presents his environmental ethics as a contribution to an animal liberation movement built on and continuing the processes of women’s liberation, black liberation and gay liberation. His ethics is based on the value theory of classical utilitarianism, which insists on impartial accounts of pleasure and pain, and has maximisation of interest satisfaction as its goal (Callicott 1998a p.10, Pojman 2001 p.33). Core in Singer’s (1998 p.31) environmental ethics is that that sentience, the capacity for suffering and enjoyment, is seen as a relevant criterion for moral treatment. He claims that this is more relevant than the anthropocentric focus on properties such as intelligence and rationality. Singer (ibid. p.27) suggests ‘that we extend to other species the basic principle of equality that most of us recognise should be extended to all members of our own species’. This does not mean, he (ibid. p.28) says, that all groups should be treated exactly the same way. As examples he (ibid. p.27) mentions that it would be meaningless when women have the right to abortion, to talk about this as a right also for men, and meaningless for a pig that cannot vote to talk about its right to vote. Singer actually emphasises that there are important differences between humans and animals, and that these differences must give rise to some differences in the rights that each have. However,
‘recognising this obvious fact’, he continues, ‘is no barrier to the case for extending the basic principle of equality to nonhuman animals’ (ibid. p.27).

**Principle of equality – equal consideration**

To clarify what he means by the basic principle of equality, Singer first explains how this works in purely human relations. He (1975 p.3) says that the basic principle of equality does not require equal treatment, but equal consideration. Equality is a moral idea, Singer (ibid. p.5) asserts, which entails that the principle of equality is not a description of equality among humans, but a prescription of how we should treat humans. There is no logically compelling reason for assuming that a factual difference justifies any difference when considering needs and interests, he says. By this Singer (1998 p.28) means that the basic principle of equality should not be based on things like shapes, sizes, intellectual abilities, moral capacities and communication skills. ‘Like it or not’, he (ibid. p.28) says, ‘we must face the fact that humans come in different shapes and sizes.’ If the demand for equality therefore should be based on the actual equality among humans, then we would have to stop demanding equality, he concludes, because it would be an unjustifiable demand due to the large variations in shapes, sizes, abilities, capacities and skills among humans (ibid. p.28).

As a warning against grounding the basic principle of equality on factual equality, Singer (1975 p.4-5) explains what the consequences might be if the opposition to racism and sexism was based on it. He says that we neither have an absolute guarantee that capacities and abilities really are distributed evenly without regard to race or sex among humans, nor that there are no genetically-based differences in abilities between races or between sexes. If such connections had been proved, both racism and sexism would in some way be defensible on the basis of factual equality. Singer claims that this kind of argument is avoided if the basic principle of equality is not seen as a description of the actual equality among humans, but, as mentioned, as a prescription of how humans should treat each other (ibid. p.5). Singer’s reasoning, which as mentioned is utilitarian, builds on Jeremy Bentham’s utilitarian understanding of moral equality. Bentham incorporated the essential basis of moral equality into his system of ethics in the formula ‘Each to count for one and none for more than one’ (ibid. p.6). As a further support to this notion of equality, Singer (ibid. p.6) refers to leading figures in contemporary moral philosophy, such as Hare and Rawls, who also have shown a great deal of agreement in specifying as a fundamental presupposition for their moral theories
a similar requirement, which operates so as to give everyone’s interest equal consideration. What is not agreed, though, is how the requirements for this are best formulated.

Speciesism – racism, sexism

Before returning to the question of how the requirements are best formulated so as to give everyone’s interest equal consideration, some words will be said about speciesism. The term speciesism is understood to mean discrimination on the basis of species, equivalent with how racism and sexism is referred to as discrimination on the basis of race or sex (Singer 1998 p.31). Speciesists are thus persons who allow the interests of their own species to override the interests of members of other species. Singer mentions three examples of speciesism. The first (ibid. p.31) is that humans eat animals as ‘purely a matter of pleasing our palate’, even though it is not a necessary nutritional need. In doing so we treat animals purely as means to our ends. Both the killing of them and the suffering we inflict on them are clear indications of speciesism, Singer asserts. As a consequence of this, Singer advocates vegetarianism. The other example (ibid. p.32-34) of speciesism is that animals are used to test medicines, psychological theories and even new shampoos and cosmetics. In this context Singer asks if the experimenter would be prepared to perform experiments on an orphaned human infant, since there seems to be no relevant characteristics that human infants possess that adult mammals do not have to the same degree.

Singer’s last example (ibid. p.34-35) is speciesism in contemporary philosophy. This is in his opinion a minor one compared with the two others when it comes to significance or social consequences. However, he contends, the example might still be of interest for those interested in environmental philosophy and ethics. Singer holds that the chief task of philosophy is to critically and carefully think through what most people take for granted. Sometimes philosophers succeed in breaking free of the prevailing ideology, but more often they become its most sophisticated defenders. He maintains that philosophy as it is practiced often does not challenge anyone’s perceptions about humans’ relations with other species. Philosophers who tackle problems that touch upon the issues of equality in relation to nonhumans often make the same unquestioned assumptions as most other people, and tend to confirm the comfortable speciesist habits. They try to reconcile their beliefs in human equality and animal inequality by arguments that can only be described as devious. Singer (ibid. p.35-37) refers specifically to William Frankena and Stanley Benn as representatives of this form of argumentation and then as the third example of speciesism.
Speciesism in contemporary philosophy – *Frankena and Benn*

Frankena opposes the idea of basing justice between humans on merit such as rationality, because, Singer (1998 p.35) claims, he sees that this could lead to highly inegalitarian results. The approach chosen by Frankena (1962 p.19) is to propose that all men are to be treated as equals because they are human and hence ‘capable of enjoying a good life in a sense in which other animals are not’. Singer (1998 p.36) comments that it is difficult to see why Frankena’s principle of equality only applies for humans, since every sentient being surely is capable of enjoying a good life and leading a life that is happier or less miserable than some alternative life. Philosophers such as Frankena tend to waffle, Singer says further, when they try to justify the moral gulf that is thought to separate humans and animals, but can find no concrete differences without undermining the equality of humans. He accuses them of ‘resort[ing] to high-sounding phrases like the intrinsic dignity of the human individual’ (ibid. p.36). They frequently introduce ideas of dignity, respect and worth at the point at which other reasons appear to be lacking, he (ibid. p.37) contends. To underline how difficult it is to find some relevant characteristic that distinguishes all humans from all members of other species, Singer refers to the existence of humans who quite clearly are below the level of awareness, self-consciousness, intelligence and sentience of many nonhumans.

When it comes to Benn, Singer (ibid. p.37) selected him as a representative of those philosophers who are prepared to face the question of equality without ignoring the existence of mental defectiveness. Benn (1967 p.69) says that anyone who chose to feed a hungry dog instead of a hungry baby would generally be reckoned morally defective. ‘This is what distinguishes our attitude to animals from our attitude to imbeciles,’ he (ibid. p.69) maintains. The way Benn justifies this is to refer to rationality as a human norm, and that irrationality is a deficiency of imbeciles but normal for a dog. He (ibid. p.70) concedes, though, that imbeciles have no characteristics superior to dogs, but denies that this would make the imbeciles members of a different species. Singer (1998 p.38) therefore finds it hard to see anything in Benn’s argument except a defence of preferring the interests of members of our own species simply because they are members of our own species.

**Animal liberation – requirements for equal consideration**

By this, Singer turns to his main issue, the question of animal liberation and the question of a requirement in moral theories that operates so as to give everyone’s interest equal
consideration. Having argued that the basic principle of equality should not be related to factual things such as shape, size and intellect, Singer (1975 p.7) asks: ‘If possessing a higher degree of intelligence does not entitle one human to use another for his own ends, how can it entitle humans to exploit nonhumans for the same purpose?’. One of the few to reflect on this question, Singer says, is Bentham, who wrote: ‘The day may come when the rest of the animal creation may acquire those rights […]. [T]he question is not, Can they reason? nor, Can they talk? but, Can they suffer?’ (Bentham 1879 p.311). Bentham here points to the capacity for suffering as the vital characteristic that gives a being the right to equal consideration. Singer (1975 p.8) emphasises that the capacity for suffering, and for that sake also enjoyment and happiness, are not just additional characteristics like the capacity for language or other intellectual activities. What is special with the capacity for suffering and enjoying things, he (ibid. p.9) says, is that it is a prerequisite for having interests at all. This is a condition that must be satisfied before we can speak of interests in any meaningful way. As an example of something that has no interest, Singer mentions a stone. Since a stone cannot suffer, it would be nonsense, he states, to say that it is against the interest of a stone to be kicked along the road. Singer’s conclusion therefore is that if a being suffers, there can be no moral justification for refusing to take that suffering into consideration. Conversely, if a being is not capable of suffering, then there is nothing to be taken into account. Based on this, he sees sentience as the only defensible boundary of concern for the interests of others.

The problem involved in drawing a line between who or what is capable of suffering and who or what is not, is, according to Singer (ibid. p.185), the problem of deciding when we are justified in assuming that a being is incapable of suffering. His (ibid. p.188) own suggestion for a good place to draw the line is somewhere between a shrimp and an oyster. At least, he says, this is as good as any line, and better than most.

Finally, despite Singer’s criticism of the killing and eating of animals, he seems actually to be uncertain on how to deal with the question of killing animals. He (1993 p.332) says that when we come to consider the value of life, we cannot say quite so confidently that a life is a life, whether it is a human life or an animal life. He (1975 p.23) holds that it is not speciesism to say that the life of a self-aware being, capable of abstract thought, of planning for the future, of complex acts of communication and so on, is more valuable than the life of a being without these capabilities.
Value-conferring properties – *sentience*

For an inner worth table based on Singer’s ethics, I find that sentience instead of rationality is an obvious or apparent candidate as a necessary and sufficient value-conferring property for ascribing a direct moral status value. Sentience instead of rationality will then be the basis that qualifies for a moral stakeholder status. Ecological entities capable of suffering are according to Singer’s suggestion mammals, birds, reptiles, amphibians, fishes and some invertebrates. The question in a practical situation is where to make the split between sentient and non-sentient ecological entities, and specifically for the present investigation, where to locate the fish. If Singer is correct in suggesting that somewhere between a shrimp and an oyster would be a good place to draw the line between who or what is capable of suffering and who or what is not, then fish certainly should belong to the class of sentient ecological entities. To what extent fishes actually are capable of suffering is, however, not scientifically proven. Research programmes have investigated this (Gjelsvik 2000, Thorolvsen 2000, Matportalen 2003, Kirkby 2003, Syal 2003), but since this question has so far not been solved, it will be left open here whether fish are to be regarded as non-sentient or sentient.

Adding Singer’s ethics, based on sentience, to the strong anthropocentric ethics, an inner worth table could be arranged as shown in mind photo 5.2.

With sentience as an alternative value-conferring property, the inner worth table gets two columns. The left column contains the traditional inter-human ethics as described in the previous section. The right column has sentience as the value-conferring property for being ascribed a direct moral status value and having a universal inner worth. Since ecological entities, such as mammals, birds, reptiles, amphibians and maybe fishes and some invertebrates, might be capable of suffering, they will then be ascribed a direct moral status value that might qualify for moral stakeholder status. Any ethical considerations should then also involve these ecological entities. The ethics applied will be an ethical position termed nature-environmental ethics, to distinguish it from the traditional inter-human ethics. As for the traditional inter-human ethics, the ecological entities which are not ascribed a direct moral status value, might either be perceived to have a kind of particular inner worth or to be of purely instrumental value only. This holds for some invertebrates, all plants, microorganisms like bacteria and viruses, and maybe also for fishes. Though not handled specifically by Singer, it is also noted in the inner worth table that supra-individual ecological entities such as species and ecosystems might only have a particular inner worth or purely instrumental value.
This is because it is taken for granted that none of these ecological entities are capable of suffering.

**Mind photo 5.2 Inner worth table – added with Singer’s ethics**

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Traditional inter-human ethics</th>
<th>Nature-environmental ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed value-conferring properties</td>
<td>Rationality</td>
<td>Sentience</td>
</tr>
<tr>
<td>Ecological entities with possible universal inner worth, Life domain</td>
<td>None</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
</tr>
<tr>
<td>Direct moral status value that might qualify for moral stakeholder status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth, but particular inner worth, Cultural domain</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems</td>
<td>Fishes(?), invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems</td>
</tr>
<tr>
<td>Recreational values</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
<tr>
<td>Aesthetic values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evolutionary values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbolic values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value Biological domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life support values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic values</td>
<td></td>
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</tr>
</tbody>
</table>

**Side comments to Singer – relevance of the conceptual model**

I have three side comments to Singer’s ethics, all of which are issues related to the relevance of the conceptual model. The first two point towards issues that will be handled further in the later parts of the development of the conceptual model. One is about the painless killing of animals and the other is about the grading of direct moral status value. The last side comment is about the buzzwords.

**Hedonistic nature-environmental ethics? – painless killing**

According to Callicott (1998a p.10-11), the utilitarian grounds on which Singer builds his ethics exposes his reasoning to all the criticism that has been worked out against classic utilitarianism. One of the criticisms is related to the balance on average of pleasure and pain among all sentient beings. As a consequence of this balance, it might, contrary to how Singer argues, be defensible to raise animals in comfort and slaughter them painlessly for food, for the mere purpose of enjoying a wide range of culinary delicacies. This is an interesting comment in light of Singer’s own uncertainty with regard to how to deal with the question of
killing animals. It might then be concluded that Singer’s nature-environmental ethics might be characterised as being hedonistic, if Callicott is correct in arguing that it is acceptable on the utilitarian grounds on which Singer builds his ethics to raise animals in comfort and slaughter them painlessly for food. This means that the focus is on the comfort and well-being of animals as long as they are alive, and that killing and slaughtering them might be acceptable as long as it is done painlessly.

**Grading of direct moral status value? – self-awareness versus sentience**

Another side comment to Singer’s ethics is linked to his statement that it is not speciesism to say that the life of a self-aware being, capable of abstract thought, of planning for the future, of complex acts of communication and so on, is more valuable than the life of a sentient animal without these capabilities. This sounds very much like the anthropocentric argumentation for why there are moral differences between humans and animals. It might reflect that Singer realises that some grading of direct moral status value between humans and animals is after all acceptable and necessary in practical situations.

**Buzzwords – lack of arguments**

When Singer accuses philosophers of ‘resorting to high-sounding phrases like the intrinsic dignity of the human individual’, it sounds like he refers to the use of buzzwords of the kind mentioned in Chapter 1 (Introduction – research area). This time, however, the terms are not used to explain positive values behind biodiversity, but to emphasise the life value behind humans. The similarity is that the buzzwords are used when philosophers, as Singer says, are faced with a situation where reasons appear to be lacking. Then, he says further philosophers frequently introduce ideas of dignity, respect and worth. This is hopefully where the conceptual model might be of some help in the analysis of values behind biodiversity. The belief is that if value preferences are disclosed and sorted, this might reduce the use of buzzwords, and by that contribute to an open and honest debate about environmental ethics.

**5.3.2 Regan – animal rights**

The next biocentric author to be presented is Regan, who counters Singer’s animal liberation ethics on the ground that utilitarianism might actually provide a basis for speciesism. Regan (1980 p.112) says that though we count the equal interests of animals and humans equally, it might just happen that the consequences of treating animals in ways that humans are not
treated, such as intensively raising animals, are better than other arrangements, all things considered. Regan’s approach to avoid this shortcoming of utilitarianism, and also his main concern, the shortcoming of anthropocentrism, is to postulate the existence of animal rights.

Regan (ibid. p.104-105) holds that it is a commonplace to say that morality places some limits on how animals may be treated, for instance that we are not to kick dogs, set fire on a cat’s tail or torment hamsters. The philosophical issue is therefore not so much whether these acts are wrong, but why they are wrong. Regan refers here to the already mentioned answer favoured by many philosophers, such as Aquinas and Kant, saying that people who treat animals badly develop a habit which inclines them to treat humans similarly. Regan is critical of this kind of moral principle, which is based merely on the concern for humankind, and not the animals themselves. He says that the Kantian account could be characterised as speciesism.

**Argument from marginal cases – also animals have rights**

To argue why it is wrong to treat animals badly, Regan (1979 p.189-190) uses the so-called argument from marginal cases in support of the view that some animals have moral rights. He says that the argument from marginal cases refers to arguments for animal rights that are grounded in considerations about the rights of non-paradigmatic or marginal humans. By non-paradigmatic or marginal humans he means babies and the mentally enfeebled, including the severely mentally enfeebled. He is careful, however, to point out that his use of the expression marginal humans is not meant to suggest that babies and the mentally enfeebled are not human beings. All he means to convey is that ‘these humans are non-paradigmatic in the sense that they do not possess those attributes […] that are paradigmatic for being human’.

The strategy Regan (ibid. p.193) has chosen is what he calls the weaker form of the argument from marginal cases. This is an argument saying that ‘if marginal humans have basic moral rights, then so do (some) animals’. The argument is weak in the sense that Regan (ibid. p.192) is far from certain that anyone at all has basic moral rights. The stronger argument, which is more difficult to defend, would be that ‘certain animals have certain rights because marginal humans have these rights’ (ibid. p.189). Regan (ibid. p.192) says that the issues involved in the dispute over the existence of basic moral rights are among the most heated in moral and political philosophy. So, instead of stating that basic moral rights exist, he restricts himself to supposing that we can agree that there are certain immoral ways of treating marginal humans.
The question then is how we best can account for such beliefs or intuitions. He assumes that this most adequately can be done only by positing the existence of basic moral rights.

By basic moral rights Regan (ibid. p.191) refers to rights that are themselves the ground of a moral obligation, and that they are not a consequence of our having a moral obligation. As an example he says that ‘if A has a basic moral right to life, then A’s having this right is itself the ground of our obligation not to take A’s life’. Non-basic moral rights, on the other hand, he describes to be grounded in obligations which are themselves based exclusively on the net value of consequences. This means that if A’s right to life is a non-basic right, then A will have a right to life only if we have a consequence-based obligation to A not to take A’s life. It is therefore consistent for any consequentialist or utilitarian, Regan says, to deny that there are basic moral rights, and to maintain that there are non-basic moral rights. However, he (ibid. p.191-192) continues, when the argument from marginal cases is used to argue that animals have rights, a survey of the literature points decisively to the idea of basic moral rights. Nowhere do we find, he maintains, an advocate of the argument from marginal cases arguing that marginal humans or other humans in general have certain rights on consequentialist grounds. He (ibid. p.217 note 3) comments specifically in this connection on Singer, who according to Regan has dissociated himself from a possible acceptance of basic moral rights.

**Criterion of right-possession – inherent value**

Regan’s main concern when examining the argument from marginal cases is to find whether there might be a reasonable criterion of right-possession. In search of such a criterion he assumes that irreversibly comatose humans have no rights because they evidently lack each and every capacity which might plausibly be thought to have a bearing on the question of why humans might have certain rights. He still holds open, however, the question of whether irreversible comatose humans actually have rights. After a thorough analysis of the validity of the argument from marginal cases, Regan concludes that the argument itself does not rule out the possibility of there being a reasonable criterion of right-possession. But still, it does not establish what such a criterion might be (Regan 1979 p.202-204).

As possible candidates for what a criterion of right-possession might be, Regan (ibid. p.200) refers to sentience, as submitted by Singer. He also refers to having interests, in the sense of having the capacity to have desires, wants, goals preferences and the like. Regan (ibid. p.205) finds that if sentience and having interests are accepted as reasonable criteria of right-
possession, then a still more basic requirement, namely consciousness, should also be accepted. This is because both sentence and interests can be met by conscious beings. He believes that we have strong reasons to regard many animals as conscious. However, though this might be seen as a sufficient condition, Regan is not convinced that consciousness can be shown to be a necessary condition of right-possession.

Regan’s (ibid. p.205-206) recommendation of what he thinks is a more reasonable criterion of right-possession than sentience, interests and consciousness, is what he refers to as the criterion of inherent value. This criterion states that a necessary and sufficient condition of having basic rights is that one has inherent value. What Regan means by inherent value is explained by the following list, which is what he takes ‘to be its most noteworthy features:

These are (1) that if any given being \( x \) has inherent value, then \( x \)’s having value of this kind is logically independent of any other being’s happening to take an interest in or otherwise valuing \( x \); (2) that \( x \)’s having inherent value makes it improper […] to treat \( x \) as though it had value only as a means […] and; (3) that because \( x \)’s having inherent value underlines the obligation to treat \( x \) with respect […]. (Regan 1979 p.206)

When asking which beings might have inherent value, Regan (ibid. p.206) says that a favoured answer is that this might be conscious beings, including those which are potentially conscious. As already mentioned, Regan (ibid. p.205) remains unconvinced of the bearings of consciousness on right-possession. He (ibid. p.206) rather holds open the possibility that even those lacking the potential for consciousness, like trees or wilderness generally, might have inherent value.

**Inherent value – subjects of a life that is better or worse**

In his further discussion of a reasonable criterion of right-possession, Regan (1979 p.206-207) says he shall not be suggesting something that is totally without philosophical roots. He thus suggests that thinking of humans as having inherent value contributes to the search for a criterion of right-possession. When Regan then starts to discuss the question of which beings might have inherent value, he asks whether all humans are inherently valuable. The Kantian answer to this, Regan believes, has morally unacceptable implications, since inherent value appears to be valid only for those humans who happen to be free and rational. The consequence, Regan says, would be that severely mentally enfeebled humans would fail to qualify as having inherent value, and the use of the enfeebled in painful, trivial scientific
research could not be objected to on the grounds that they are mistreated. His own belief is that there are certain ways of treating even the severely mentally enfeebled that would fail to show a proper respect for them. Supposing therefore that it is right that even the severely mentally enfeebled have inherent value, he asks how that should be accounted for. Regan says that this question is not answered merely by rejecting the Kantian position, nor is it answered by insisting that they are sentient and have interests. His approach is rather to ask ‘whether there is anything about the value of the lives of all but the irreversible comatose which helps illuminating why all but these humans have inherent value’(ibid. p.208). The answer he (ibid. p.209) gives to this is that all humans, except the irreversible comatose, are what he calls subjects of a life that is better or worse. The expression “subject of a life”, in the sense in which it is used by Regan (1983 p.243), involves more than merely being alive and more than merely being conscious. Regan explains it the following way:

 Individuals are subject-of-a-life if they have beliefs and desires; perception, memory, and a sense of the future, including their own future; an emotional life together with feelings of pleasure and pain; preference- and welfare-interests; the ability to initiate action in pursuit of their desires and goals; a psychophysical identity over time; and an individual welfare in the sense that their experiential life fares well or ill for them, logically independently of their utility for others and logically independently of their being the object of anyone else’s interests. (Regan 1983 p.243)

Regan (1979 p.208-209) holds that all humans in question, including the severely mentally enfeebled, not only are alive, but are subjects of a life, which itself has value and is better or worse for the individuals whose life it is. This is logically independent of any other beings taking an interest in them or finding them useful as means. Thus, it appears, Regan says, that we account best for the inherent value of the humans in question by making reference to the fact that the value of their life is logically independent of their being useful as means. This resembles Kant’s imperative about always treating an individual as an end, never merely as means (Regan 1980 p.115). Regan (1983 p.84-85) assumes that the class of beings that are subjects of a life can be characterised in term of a certain kind of autonomy or self-determination. This is, however, not the Kantian agent-autonomy which requires reason and free will, but a weaker version which Regan calls preference autonomy. Individuals are autonomous in this sense if they have preferences and the ability to initiate actions with a view to satisfying them.
Regan draws, however, a distinction between those that can lead a life which is better or worse and those that cannot lead it, but still have such a life. The severely mentally enfeebled are examples of humans that can have, but do in fact not lead a life that is better or worse. In this connection Regan brings again forth the relevance of sentience and interests as criteria to the question of right-possession. He says that viewed against the backdrop of the criterion of inherent value, their place in grounding rights can be seen more clearly. If beings have inherent value if they can have or lead a life which is better or worse for them, Regan says, then sentience and interests are both logically necessary condition for this, and in that sense are relevant to the question of right-possession (Regan 1979 p.210-212). But again he (ibid. p.215) holds open the question of whether it is only conscious beings which can be inherently valuable or if the irreversible comatose humans can have rights.

**Practical ethics I – grading of inherent worth?**

When qualifying in practice who has inherent value, grounded on who can lead a life which is better or worse, Regan (1979 p.210) says that normal, adult humans are paradigms of such beings. They ‘embody the capacities of autonomy and rationality’, which, as Regan expresses it, ‘are justly so celebrated by Kant’. These are the beings that are capable of moral agency. Other humans, such as the severely mentally enfeebled, who cannot lead that kind of a life, have no possibility of moral agency, he explains, because they lack the intellectual prerequisites for wilful control of their lives. Similarly to how Wetlesen, as mentioned in Chapter 3 (Method – *a post-normal science approach*), define moral agents, Armstrong and Botzler (1993 p.321) say with reference to Regan (1983) that moral agents should be understood to be those individuals who are morally accountable, while moral patients are not. Moral patients are then such as human infants, the mentally deranged and most nonhuman mammals. Because the severely mentally enfeebled lack the possibility of moral agency, Regan (1979 p.210) asserts that not all humans who are not irreversible comatose have equal inherent value. It is not implausible to suppose, he argues further, that normal, adult humans can be regarded as themselves having greater inherent value than the enfeebled. Regan (ibid. p.210) emphasises, though, that this does not entail that those with greater inherent value can treat those with less inherent value any way they please. It is more that the normal, adult humans should ensure as best they can that the needs of the enfeebled will be met (Regan ibid. p.211).
In later writings, however, Regan (1983 p.412) rejects the notion that beings might have different degrees of inherent value. Instead he (ibid. p.244) says that inherent value should be conceived to be a categorical value admitting of no degrees, and that moral agents and moral patients thus have equally inherent value. On the other hand, Regan realises that some kind of weighting might be necessary to solve practical questions in real-life situations. He (ibid. p.305-308) refers in this connection to what he calls the miniride and worse-off principles. The miniride principle says that the rights of the few could be overridden by the rights of the many if each affected individual will be harmed in a comparable way. The worse-off principle on the other hand says that if the few would be worse-off than the many, then the rights of the many should be overridden.

**Practical ethics II – self-consciousness, consciousness, sentience**

Regan’s overall conclusion is that consistency requires that if humans who are said to have basic moral rights in the argument from marginal cases do in fact have them, then any nonhuman being meeting this criterion must also be assumed to have such rights. This then comes down, he continues, to the question of whether it is true that nonhumans have inherent value, and thus have forms of life that are better or worse for them. Though Regan does not know how this might be proven true, he believes that it is just as reasonable as in the case of the mentally enfeebled to think that animals have forms of life that are better or worse for them, and that they have a type of value that is logically independent of any other being’s happening to find them useful (Regan 1979 p.212-213).

On this basis the practical question is which ecological entities are to be included as relevantly similar to the marginal humans. Regan\(^{13}\) proposes three alternatives dependent on what is taken to be a necessary condition for the attribution of inherent value. One possibility, he says, is to include animals who are not agents, but who have self-consciousness (Regan 1983 p.153). Another possibility is to include animals that have consciousness or sentience, but not self-consciousness. The third alternative is to include non-sentient animals, as well as other individual non-sentient organisms, such as plants and microorganisms. A forth possibility is to include certain collections of individuals or supra-individual systems (ibid. p.246, 362).

\(^{13}\) The formulations of Regan’s opinions and expressions are in this and the next passage largely based on Wetlesen (1993 p.4), while references are made to Regan’s text.
Regan (ibid. p.245, 319) does not attempt to take a clear position on these possibilities. He suggests that an environmental ethics might possibly be worked out on the basis of one or more of these answers, but he leaves this to others. Instead, he limits himself to the first possibility mentioned above, and assumes that self-consciousness is a sufficient, but not a necessary condition for the attribution of inherent value. He (ibid. p.86, 358) supposes that this criterion will include at least all normal mammals of one year or more.

When discussing animal rights further, Regan (1979 p.215) first raises the question of what particular basic moral rights marginal humans do have. The short answer, he says, is that this varies. His longer answer is that ‘one can have a particular right […] only if one can have or do what having the right would give one the right to have (or to do)’ (ibid. p.215). An example is that the right to freedom of movement, which is a right that a being can have only if it has the capacity to carry out intentional bodily movements. There will be some marginal humans who could have this right while others could not. This is parallel with Singer’s example of the women’s right to abortion, and pigs’ right to vote. Regan describes this as a matter that would have to be settled by considering sub-classes of marginal humans with respect to different capacities. This being so, he says, it should not surprise us that a similar finding ought to be reached regarding what particular rights animals have (ibid. p.216). Thus, if we are led to ascribe the right not to be made to suffer gratuitously to a sub-set of marginal humans, then, assuming that the argument from marginal cases is sound, we shall have just as much reason to ascribe this same right to some animals, Regan (ibid. p.217) concludes.

**Practical ethics III – sport hunting**

In a further more practical discussion of animal rights in relation to hunting and trapping, Regan (1983 p.353) holds that it sometimes can be justified to override the animals’ rights if the animals pose threats to humans. However, when we turn from cases where humans have to protect themselves to the activities of hunting and trapping for profit or sport, Regan says that the standard justifications are that those engaged in it get exercise and take pleasure in communion with nature, camaraderie and satisfaction in good shooting. These justifications ‘are lame, given the rights view’, Regan (ibid. p.354) concludes. Appeal to traditions has no more force in the case of hunting than in any other customary abuse of animals, he says. Also the philosophy of maximum sustainable yield as a way to reduce the total amount of suffering due to starvation, is according to Regan (ibid. p.354-356) a systematic ignorance of the rights of wild animals. Regan’s conclusion is in short that the rights view categorically condemns
sport hunting and trapping. When moving from sport to the commercial exploitation of wildlife, the moral scene as such is the same, but worse, Regan (ibid. p.357-259) contends, because the number of animals involved is greater. Even if this might threaten businesses and diminish the welfare of those engaged in commercial exploitation of wild animals, Regan maintains that there are no reasons why we should continue to allow it. In the same sense, he argues against the domestication of animals in agriculture, in both traditional as well as modern intensive production systems.

When defenders of hunting claim that what they do is no different in kind from what animals do in the state of nature, Regan (ibid. p.324-325) responds that since animals are not moral agents, they have no moral duties. The total amount of suffering that animals cause one another in the wild is therefore not the concern of moral humans.

Though Regan limits the practical discussion of animal rights to normal mammalian animals, aged one year or more, he means that this should hold also for newly born mammals, because they have the potential to meet the subject of life criterion outlined for the discussion. Regan concludes that hunting infant mammalian animals cannot be approved ‘unless one would be willing to approve of harming human infants in pursuit of sport or profit’ (ibid. p.325).

**Supra-individual ecological entities – inherent versus intrinsic values**
When touching upon the issues of endangered species and the holistic view of nature versus the more individualistic view of moral rights, Regan holds that the individualistic view is not opposed to the efforts to save species and ecosystems. He actually does not deny the possibility that systems of natural objects might have inherent value. But since he has difficulties seeing how moral rights meaningfully could be attributed to ecosystems, he would rather focus on communities as collections of individuals. Would not the biotic community be preserved if we were to show proper respect for the rights of the individuals who make up the community, he asks. When it comes specifically to the efforts to save endangered species, he holds that the rights view supports this, not because the animals are few, but because they are equal in value to all who have inherent value. He adds, however, that the rights view does not deny the importance of human aesthetic, scientific, sacramental and other interests in rare and endangered species. What he denies is that the value of these animals is reducible to the aggregated satisfaction of human interests. In summary, Regan states that if individual nonhumans have inherent value, they have a kind of value that is not the same as the intrinsic
values of pleasure, preference-satisfactions and the like it might represent for others. His rights-based environmental ethics would not accept wilderness to be uprooted in the name of human progress, whether this is in relation to economic, educational, recreational or other human interests. On the other hand, he holds strongly that individual rights are not to be outweighed by the care for the biotic community. He refers here to Leopold’s statement that ‘a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community’, a statement which Regan fears can lead to “environmental fascism”. This means prioritising of a kind that might allow killing humans if that would be necessary to save endangered species (Regan 1983 p.359-363).

**Value-conferring properties – self-consciousness**

Searching then for value-conferring properties to be used in the inner worth table, this subsection is an effort to take Regan at face value when he leaves it to others to work out environmental ethics on the basis of one or more of his proposed alternatives. These are the alternatives for what might be necessary conditions for the attribution of inherent value. If not fully answering Regan’s invitation to work out an environmental ethics, this subsection can hopefully give a small contribution to it. One starting point then is to see how Regan’s proposed alternative conditions for the attribution of inherent value might be applied as value-conferring properties for ascribing direct moral status value. Three of these alternatives are those which either only include animals that are self-conscious, or also those that are conscious or sentient, or finally even all kinds of non-sentient organisms. They might all be candidates for direct moral status value because they represent individual ecological entities that at least might have lives that are better or worse for them, and thus according to Regan have inherent value. The fourth alternative, which is the possibility of attributing inherent value to supra-individual ecological entities, is commented on in the side comments, and will be discussed further in connection with the ecocentric ethics.

Since Regan assumes that self-consciousness is a sufficient condition for the attribution of inherent value, it should be reasonable to say that it also will work as a value-conferring property for ascribing a direct moral status value. If applying the possibility of leading a life that is better or worse as a basis for inherent value, then also conscious or sentient animals, despite Regan’s reluctance to take a position on this, might be ascribed a direct moral status value. Less clear is the situation for non-sentient beings, which probably cannot lead lives, but only passively might be able to live lives that are better or worse. Regan says, though, that
even non-sentient organisms might have interests, but this does not help much, since he not is willing to state whether non-sentient organisms might have inherent value or not.

**Grading of direct moral status value – self-conscious, conscious and sentient, non-sentient**

The next aspect to be clarified is if all ecological entities that might be ascribed a direct moral status value, whether non-sentient organisms are included or not, also qualify for moral stakeholder status. One option is, as assumed so far in the development of the inner worth table, that whatever might be accepted as a value-conferring property for ascribing direct moral status value, also qualifies for moral stakeholder status. Another option is a grading of direct moral status value. This might entail that only certain degrees of the direct moral status value will qualify for moral stakeholder status. Although Regan in his later writings rejects his earlier idea of different degrees of inherent value, he admits by his miniride and worse-off principles that some prescriptions are necessary for the practical adjustments of his theory (Wetlesen 1999 p.312-314). Wetlesen interprets Regan’s writings to mean that there are reasons after all to assume that nonhuman living organisms can have a gradual direct moral status value. Wetlesen says even that Regan’s ethical theory would permit the use of lower animals on a par with plants as having only instrumental value. It should therefore, I believe, not be too far off to think of different degrees of direct moral status value when discussing Regan’s proposed alternative conditions for the attribution of inherent value. It sounds quite sensible that self-conscious individuals, such as normal mammals of one year or more that are able to lead lives that are better or worse for them, might be attributed a greater inherent value than non-sentient plants and microorganisms which only can have lives, but not lead lives that are better or worse.

There are, however, some problems with the grading of direct moral status value when based on Regan's alternatives for the attribution of inherent value. This is because it involves the question of marginal humans, in the sense that if the grading is applied on nonhumans, it also strictly speaking should apply for humans. However, since Regan in his practical elaborations of different possible conditions for the attribution of inherent value focuses on nonhumans, this is used as the basis for the input to inner worth table, thus leaving out the challenges related to marginal humans.
Self-consciousness – *third value-conferring property*

Since Regan at least assumes that self-consciousness might be a sufficient condition for the attribution of inherent value, my conclusion from all this is that self-consciousness will be added to the inner worth table as the third proposed value-conferring property for ascribing direct moral status value to mammals, which then also might qualify for a moral stakeholder status. When it comes to consciousness and sentience, Regan’s reluctance to take a clear stand on this renders a conclusion regarding moral stakeholder status more uncertain. His reluctance appears a little strange, since he seems to mean that conscious and sentient animals probably are able to lead lives that are better or worse for them. Be that as it may, as long as Regan does not deny that consciousness or sentence might be possible conditions for the attribution of inherent value, but rather mentions them as a possibility, there are no strong reasons for arguing against the conclusion made on the basis of Singer’s ethics, namely that sentience in the inner worth table is noted as a value-conferring property for ascribing a direct moral status value that might qualify for a moral stakeholder status. Since Regan sees consciousness as a basic requirement for sentience, it will be added in the inner worth table that consciousness is a proposed value-conferring property together with sentience. To what extent non-sentient organisms also might be ascribed a direct moral status value is even less clear according to Regan’s elaborations. This question will be discussed further in the next two sections.

Nature-environmental ethics – *proper versus hedonistic*

The question of painless killing of animals for the purpose of satisfying human needs and preferences, which Callicott addresses in connection with Singer’s ethics, is not mentioned specifically by Regan. If the painless killing of animals can only be acceptable on the basis of Singer’s utilitarian ethics and not under Regan’s rights ethics, then a distinction should be made between these two ethical theories. As mentioned in the side comments to Singer’s nature-environmental ethics, his ethical theory might be characterised as being hedonistic if the focus is on the comfort and well-being of animals as long as they are alive, and the painless slaughtering or killing should be accepted. If Regan’s ethics would not under any circumstances allow the killing of animals, except if they pose threats to humans, then his ethics might be said to represent a proper nature-environmental ethical position.

However, if the grading of direct moral status value is applied, then there should be reasons to believe that it would be acceptable on the basis of Regan’s nature-environmental ethics to kill individual ecological entities with a low direct moral status value, at least if they have no
sense of pain on a par with plants. In that case, Regan’s rights ethics would tend towards the
hedonistic version due to the role sentience and consciousness play as criteria for right-
possession. On the other hand, it is uncertain to what extent it actually would be acceptable
under Singer’s ethics to kill sentient animals for food under any circumstances, since Singer
as a general rule advocates vegetarianism, which means that this ethics might tend towards the
proper version. When adding Regan’s nature-environmental ethics to Singer’s in the inner
worth table, I have therefore noted with a question mark that there are uncertainties to whether
these ethics should be characterised as hedonistic or proper nature-environmental ethics.

The inner worth table will then, when combining the interpretations of Regan with Singer’s
ethics and the strong anthropocentric ethics, appear as shown in mind photo 5.3.

**Mind photo 5.3 Inner worth table – added with Regan’s ethics**

| Inner worth of ecological entities – Regan’s ethics |
|----------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| (Strong anthropocentrism ethics, and biocentric ethics by Singer and Regan) |
| Ethical positions | Traditional inter-human ethics | Nature-environmental ethics - hedonistic or proper? |
| **Proposed value-conferring properties** | **Rationality** | **Self-consciousness** | **Consciousness, sentience** |
| Ecological entities with possible universal inner worth, Life domain | None | Mammals | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates |
| Direct moral status value that might qualify for moral stakeholder status | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates | |
| or no universal inner worth, but particular inner worth, Cultural domain | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems | Birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems | Fishes(?), invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems |
| Recreational values | Same as above | Same as above | Same as above |
| Aesthetic values | | | |
| Scientific values | | | |
| Evolutionary values | | | |
| Symbolic values | | | |
| Religious values | | | |
| or no universal inner worth, but purely instrumental value, Biological domain | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems | Birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems | Fishes(?) and supra-individual ecological entities such as species and ecosystems |
| Life support values | | | |
| Cultural domain | | | |
| Economic values | | | |

New here is the column in the middle with self-consciousness as a proposed value-conferring
property, and consciousness added to the sentience column at the right. As mentioned, I have
denoted these two columns together as representing nature-environmental ethical positions,
but with an added question mark about whether they represent a kind of hedonistic or proper
nature-environmental ethics. The contents of the universal inner worth, the particular inner
worth and the purely instrumental value rows in the sentience column at the right are
unchanged despite the addition of consciousness as a value-conferring property. Also, the
content of the rows in the left column with rationality as a value-conferring property are
unchanged. For the new column in the middle, with self-consciousness as the proposed value-
conferring property, it is noted that mammals are ascribed a direct moral status value that
might qualify for moral stakeholder status, and thus have a universal inner worth. This is
based on Regan’s notion that at least all normal mammals of one year or more are supposed to
be self-conscious. For the rest of the ecological entities, which are birds, reptiles, amphibians,
fishes, invertebrates, all plants, microorganisms like bacteria and viruses, and supra-individual
ecological entities such as species and ecosystems, it is marked that they either might be
perceived to have a kind of particular inner worth or to be of purely instrumental value only.

Side comments to Regan – relevance of the conceptual model

One side comment about Regan’s animal rights ethics related to the relevance of the
conceptual model is given. This is about the particular inner worth value category.

Intrinsic value – particular inner worth

Regan holds that the rights view does not deny the importance of human aesthetic, scientific,
sacramental and other interests in rare and endangered species. What he denies is that the
value of these animals is reducible to the aggregated satisfaction of human interests, since if
individual nonhumans have inherent value, they have a kind of value that is not the same as
the intrinsic values of pleasure, preference-satisfactions and the like of others. This means,
Regan explains, that his rights-based environmental ethics would not accept wilderness to be
uprooted in the name of human progress, whether this is in relation to economic, educational,
recreational or other human interests.

Firstly, with his references to aesthetic, scientific and sacramental kinds of interests in
ecological entities, and to the intrinsic values of pleasure and preference-satisfactions it
sounds like Regan talks about particular inner worth. Secondly, by distinguishing this from
inherent value, Regan actually addresses the blurred borderline between universal inner worth
and particular inner worth, and the question of instrumental values linked to this, as addressed
in Chapter 3 (Method – a post-normal science approach). When he says that inherent value is
not the same as intrinsic values such as pleasure preference and satisfaction, this sounds like
he means that intrinsic values of this kind, just as particular inner worth, are strictly speaking instrumental.

**Side comments to Regan – issues for the judgements of ethical records**
The next side comment is about judgements of ethical records. This concerns certain issues addressed by Regan in his elaborations of practical ethics in relation to hunting.

**Hunting and trapping – angling and game fishing**
Regan holds that hunting and trapping may sometimes justifiably override the animals’ rights if the animals pose threats to humans. But if hunting and trapping is for profit or sport, then Regan holds that the justifications that are offered for this are lame, given the rights view. Regan mentions also that the philosophy of maximum sustainable yield as a way to reduce the total amount of suffering due to starvation is a systematic ignorance of the rights of wild animals. Regan concludes that the rights view categorically condemns sport hunting and trapping, the commercial exploitation of wildlife and the domestication of animals in agriculture. These are topics that will be addressed in the discussion of ethical records in the case study, both in relation to the domestication of salmon and in relation to the traditional angling and game fishing of wild salmon.

**Side comments to Regan – issues related to ecological literacy**
Finally is one side comment about ecological literacy and one about supra-individual ecological entities.

**Ecological literacy – knowledge and care parts?**
When Regan leaves it to others to work out environmental ethics on the basis of his proposed alternatives for what might be necessary conditions for the attribution of inherent value, there should be something in Regan’s ethical theory to act as guidance for how this should be done. This something, I believe, might be a kind of attitude or a world view that could work as a basis for making sound environmental ethical judgements.

The kind of attitude or world view I think of is linked to what Regan calls the most noteworthy features of inherent value. These can be summarised as being the obligation to not treat an ecological entity only as a means, but to treat it with respect, independent of other interests in that entity. This is, as mentioned, almost like the Kantian thinking that humanity
should never merely be used as means, but this time in Regan’s version it is also applied to nonhumans. The attitude or world view might, as an option, be based on the care part of ecological literacy, more or less the same way as the attitude of love towards animals created when being in contact with them and observing their behaviour. The difference is that the ecological literacy in the context of Regan’s ethics, contrary to the context of the strong anthropocentric ethics, might result in extending universal inner worth to a greater range of ecological entities.

Another reflection linked to Regan’s ethical theory is that there might be some kind of ecological literacy of the knowledge part involved when determining which ecological entities are subjects of a life that is better or worse. It should at least involve some knowledge about the ecological entities. This knowledge might in turn create love, respect and care for ecological entities, and contribute to an attitude for sound environmental ethical judgements.

I am not saying that Regan’s ethics necessarily depends on ecological literacy. What I do is to indicate how ecological literacy might represent a basis for the attitude or world view that is linked with the most noteworthy features of inherent value. This is not because ecological literacy readily appears as a basis for Regan’s ethics. It is rather the opposite, since it is due to Regan’s reluctance in saying specifically which beings might have inherent value and leaving it to others to work out an environmental ethics that I see the need of puzzling over how this might turn out. It is in this setting I suspect that Regan’s ethics, despite everything, will be dependent on different persons’ particular care for and knowledge about ecological entities, and thus their ecological literacy.

**Supra-individual ecological entities – universal inner worth?**

It is interesting to note that Regan, despite his prime individualistic focus on animal rights, suggests the possibility that even supra-individual ecological entities, or supra-individual systems as he terms it, might have inherent value. When he more or less excuses himself by saying that he currently has difficulties in seeing how moral rights meaningfully could be attributed to ecosystems, he in a way invites a discussion of ecocentric ethics. This means a discussion of whether supra-individual ecological entities might have a universal inner worth, which is the main topic of the next subchapter. What Regan does so far, then, is to focus on communities as collections of individuals. He seems to trust that the biotic community is preserved if we show proper respect for the rights of the individuals who make up the
community. Further, Regan holds strongly that individual rights are not to be outweighed by the care for the biotic community, which he fears can lead to “environmental fascism” where the killing of humans might be allowed if that would be necessary to save endangered species. This might mean that he perceives supra-individual ecological entities primarily as support functions for individual entities. Regan’s ethics seems therefore at least to tend towards a focus on the anthropocentric functional ecosystem health aspect of sustainability with focus on particular ecosystem services.

On this basis then, it might be suggested that Regan’s ethics, as for the strong anthropocentric ethics, will tend towards the anthropocentric structural ecosystem aspect of sustainability and focus on evolutionary abilities in pace with increased ecological literacy. Contrary to the strong anthropocentric ethics, however, it is possible that Regan would agree that this ultimately might end with a perception that accepts the nonanthropocentric structural ecosystem aspect of sustainability. This means that if ecological literacy represents a basis for the attitude or world view that are linked with the most noteworthy features of inherent value, then it might be a basis also for possible inherent value of supra-individual ecological entities. Regan might therefore see this as a way of how moral rights meaningfully could be attributed to ecosystems, and thus that supra-individual ecological entities might have a universal inner worth.

5.3.3 Goodpaster – moral considerability

Goodpaster goes according to Callicott (1998a p.11) a step further than Singer and Regan by going beyond animal liberation and animal rights into what he, as mentioned, calls an environmental ethics proper. He agrees with Bentham and Singer that withholding moral considerability from entities that fail to meet restrictive criteria such as rationality is neither intellectually honest nor ultimately warranted. Goodpaster disagrees, however, that the line for being morally considerable is to be drawn by the sentience criterion. This is because he does not consider sentience as an end, but rather as a means to life. Goodpaster (1998 p.57-58) says that neither rationality nor the capacity to experience pleasure and pain seem to be necessary conditions for moral consideration, even though they may be sufficient conditions. Nothing short of the condition of being alive seems to Goodpaster to be a plausible and nonarbitrary criterion of moral consideration. This has some similarities with Rolston’s (1988 p.23-25) notion about the life value type when he says that life is one of the rarest things in
the universe, something which by itself should be a good reason to prove it of interest. Goodpaster comments further that our paradigms of moral considerability are individual persons and their joys and sorrows, and that he wants to venture the belief that the universe of moral considerability is more complex. With these ‘cards on the table’, Goodpaster (1998 p.58) says, he ‘spell[s] out a few rules of the game’, which are based on the condition of being alive as a plausible criterion for moral consideration.

**Four distinctions – I, II, III, IV and conclusions**

Goodpaster makes four distinctions with regard to the use of ethical terms. These will be described in the following

**Distinctions I – moral rights and moral considerability**

The first distinction is between moral rights and moral considerability. Goodpaster (1998 p.58-59) sees the notion of rights as more specific than that of considerability. It therefore remains open whether beings that deserve moral consideration also possess moral rights. By this he will avoid the complications over the specific requirement for an appropriate bearer of or condition for rights.

**Distinctions II – moral considerability and moral significance**

The second distinction is between what he (ibid. p.59) calls a criterion of moral considerability and a criterion of moral significance. Goodpaster is here aiming at governing comparative judgements of moral weight in case of conflict. This means weighing in questions such as whether trees deserve more or less moral consideration than dogs, or dogs more or less than humans.

**Distinctions III – intelligibility and normative substances**

The third distinction turns on the difference between the question of intelligibility and the question of normative substances, which Goodpaster (ibid. p.59) also calls a distinction between the conceptual and the substantive. With reference to Feinberg (1974) Goodpaster says that it is tempting to distinguish the question of what sorts of beings that logically can be said to deserve moral consideration from the question of what sorts of beings that deserve moral consideration as a matter of ethical facts. By ethical facts he refers to such as moral norms that are accepted in a society. Goodpaster’s (1998 p.59) intention is to address that there are no clear distinctions between the intelligible or logic descriptive analyses of what
might have a status as morally considerable, and what on the more normative ethical grounds ought to have this status. As examples of this difficulty, Goodpaster mentions that there were times and societies in which it might be argued that the moral standing of blacks, women and children was deniable on conceptual grounds. He says that the lesson to be learned from this is that metaethics is, and has always been, a partial normative discipline.

**Distinctions IV – regulative and operative moral considerability**

The last distinction is between regulative and operative moral considerability. Goodpaster (ibid. p.60) uses the term operative for moral duties that are practically determinative by an agent’s psychological capacities for practical response. If moral demands are ideally determinative, so that moral considerability is defensible on all grounds independent of operativity, then they are regulative, Goodpaster explains. He says further that the regulative character of the moral consideration ascribable to all living things calls for sensitivity and awareness.

**Conclusion – being alive**

Using the four distinctions, Goodpaster (ibid. p.60) argues that the issue of what is required for deserving to be considered morally can be stated as a ‘concern for a relatively substantive (vs. purely logical) criterion of moral considerability (vs. moral significance) of a regulative (vs. operative) sort’. Based on this, Goodpaster (ibid. p.60-61) starts to explain why he claims that being alive is both necessary and sufficient for moral considerability. He finds the Kantian rationality principle, which eliminates children and mentally handicapped adults, to be an arbitrary boundary of moral considerability. He has the same view on potential rationality, which is meant to include marginal humans. Goodpaster does not believe that it is the potential for rationality that is the reason why we should not maltreat children and the mentally handicapped. Moving to sentience, described as the capacity of suffering and pleasure, Goodpaster (ibid. p.61-63) sees that this might be sufficient for moral considerability, but he fails to understand the reason for deeming such a criterion to be necessary. As mentioned, he sees pleasure as an indicator only, and not a goal in itself.

Goodpaster (ibid. p.64) refers to Feinberg’s interest principle. Feinberg (1974 p.49-51) claims that a being cannot intelligibly be said to possess moral rights unless that being satisfies the interest principle. In short, Feinberg’s interest principle states that only beings that have or can have interests can deserve moral consideration. He uses this to argue that only humans and
higher order animals satisfy the interest principle. Goodpaster (1998 p.65), however, holds on his side that the same line of argument can be used in favour also of non-sentient beings. He argues that living organisms such as plants can be said to have interests in relation to, for instance, their need for sun and water. He claims that the interests that non-sentient beings share with sentient beings are far more plausible as criteria of considerability than the interests that sentient beings share alone. This is not to say, he maintains, that interests constructed by pleasure and suffering are morally irrelevant. They may in fact play a role as criteria of moral significance. It is more that ‘psychological and hedonistic capacities’, as Goodpaster (ibid. p.65) expresses it, seem unnecessarily sophisticated when it comes to locating the minimal conditions for something deserving to be valued for its own sake. He (ibid. p.66) concludes therefore with his suggestion of being alive as the criterion for moral considerability, which he calls a life principle, and says fits with the interest principle.

Conclusion – grading of moral worth?
Callicott (1998a p.11) sees Goodpaster’s life-principle ethics as minimalistic in the sense that it avoids the issue of how much weight we ought to give the interests of plants and other barely living beings. Callicott refers to the distinction Goodpaster makes when he says that being alive makes one morally considerable, while the capacity of pleasure and suffering may play a role as criteria of moral significance. Pojman (2001 p.112) interprets this to mean that possessing a life makes an organism morally considerable, but not of equal moral worth with sentient beings like humans. This touches on the practical consequences of the life principle. Goodpaster (1998 p.68) is aware of this and says that the clearest and most decisive refutation of the principle of respect for life is that one cannot live according to it. If this cannot be met with the distinction between moral considerability and moral significance, he (ibid. p.69) says, then it might be met by the distinction between regulative and operative moral consideration. There are operational limits to the operational character of the respect for living things, Goodpaster explains. This is because we must eat and protect ourselves from predation and diseases, something which at times involves killing. However, he emphasises, as mentioned, that the regulative character of the moral consideration ascribable to all living things calls for sensitivity and awareness.

Value-conferring properties – being alive
Ideally Goodpaster’s condition of being alive as a criterion for moral considerability might be used as the only value-conferring property that is both necessary and sufficient for ascribing
direct moral status value to individual ecological entities. On this basis, all individual ecological entities might qualify for a moral stakeholder status. This ethics might then, as Goodpaster expresses it, be characterised as an environmental ethics proper. In the inner worth table this is, as mentioned, expressed as proper nature-environmental ethics. Goodpaster therefore clearly goes a step further than Regan, who says that to be a subject of a life that is better or worse as a basis for inherent value is more than merely being alive.

However, Goodpaster is well aware of the difficulties of living in accordance with the principle of respect for life, and that there are limits to the operational character of this principle. Parallel to this are the challenges that Regan probably sees when he claims that non-sentient nonhuman beings might have inherent value, but does not attempt to take a clear position on this. Most explicitly, as mentioned above, Goodpaster illustrates the practical ethical challenges by the need humans have to eat and to protect themselves from predation and diseases, something which at times involves killing. When he, by way of dealing with this challenge, advises the use of moral significance and operative moral considerability, it seems that he realises that there might be some practical differences in the inner worth of ecological entities, and that he probably accepts the idea of some kind of grading of direct moral status value. This is similar to when he contends that being alive makes one morally considerable, while the capacity of pleasure and suffering may play a role as a criterion of moral significance, and therefore a way of judging moral weight in cases of conflicts. This might be interpreted to mean, as Pojman does, that possessing a life makes an organism morally considerable, but not of equal moral worth with sentient beings like humans. Though Goodpaster says that he will go beyond the rationality, consciousness and sentience criteria, he still leans on such criteria when he talks about moral significance and operative moral.

**Being alive – structural value-conferring property**

With regard to the inner worth table, being alive can be added as a value-conferring property, taking care of a possible direct moral status value of non-sentient organisms. It should be noted that being alive as a value-conferring property is different in type from rationality, self-consciousness, consciousness and sentience. They are all properties that characterise different kinds of capacities or functions that living organisms might have. These properties relate more to what an organism can do, and might therefore be termed functional properties. Being alive, on the other hand, is more about what an organism *is*. It is a kind of holistic term that describes what the different functions are a part of. Being alive will therefore be referred to as
a structural property. The functional properties are thus elements which might be necessary for different ecological entities’ more structural wholes or identities. This is parallel with Westra’s distinction between structural and functional integrity, as described in Chapter 4 (Sustainability Context – contemporary perceptions).

The structural property of being alive brings in a new dimension to the table. It supports the idea of a universal basic ground for why living ecological entities might have some kind or degree of direct moral status value in contrast to dead entities like stones and mountains.

**Nature-environmental ethics – proper versus semi-proper**

Goodpaster’s ethics, when based on being alive as a necessary and sufficient value-conferring property, could then, as mentioned, certainly be characterised as proper nature-environmental ethics. However, when it comes to practical ethical assessments, where Goodpaster leans on capacities such as consciousness and sentience, which he terms psychological and hedonistic capacities, the ethics tends more towards a hedonistic natural-environmental ethical kind of position. In the inner worth table, therefore, Goodpaster’s value-conferring property of being alive is given a separate column to the right, termed proper nature-environmental ethics, while the two columns that were headed to represent either hedonistic or proper environmental-ethical positions are joined together in one column. Here the term “semi-proper” is used instead of “proper” because the ethics involved is not applied on all kinds of individual ecological entities.

The inner worth table based on Singer’s, Regan’s and Goodpaster’s biocentric ethics, and the strong anthropocentric ethics, appears as shown in mind photo 5.4.

In the right column representing the proper nature-environmental ethical position, it is noted that all individual ecological entities will have a universal inner worth if they are ascribed a direct moral status value that might qualify for moral stakeholder status. Since Goodpaster’s ethics focuses on individual ecological entities only, his condition of being alive as a criterion for moral considerability does not apply for supra-individual ecological entities, thus leaving them to have a particular inner worth or to be of purely instrumental value.
## Inner worth of ecological entities – Goodpaster’s ethics

(Strong anthropocentrism ethics, and biocentric ethics by Singer, Regan and Goodpaster)

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Proposed value-conferring properties</th>
<th>Rationality</th>
<th>Self-consciousness, consciousness, sentience</th>
<th>Being alive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional inter-human ethics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedonistic or semi-proper nature-environmental ethics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proper nature-environmental ethics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Ecological entities with possible universal inner worth, moral stakeholder status |
|--------------------------------------|----------------------------------|-------------|-----------------------------------------------|
| Life domain                          | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?) | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?) |
| Direct moral status value             | None                             | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?) |
| Biological domain                    | None                             | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?) |

| or no universal inner worth, but particular inner worth, cultural domain |
|--------------------------------------|----------------------------------|-------------|-----------------------------------------------|
| Recreational values                  | Mammals, birds, reptiles, amphibia, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Aesthetic values                     | Same as above                     | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Scientific values                    | Same as above                      | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Evolutionary values                  | Same as above                      | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Symbolic values                      | Same as above                      | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Religious values                     | Same as above                      | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |

| or no universal inner worth, but purely instrumental value, biological domain |
|--------------------------------------|----------------------------------|-------------|-----------------------------------------------|
| Life support values                  | Mammals, birds, reptiles, amphibia, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Cultural domain                      | Mammals, birds, reptiles, amphibia, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |
| Economic values                      | Mammals, birds, reptiles, amphibia, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems |

The column representing self-consciousness and the column representing consciousness and sentience-related properties, which Singer, Regan and also Goodpaster in different ways base their practical ethics on, are now joined together into the column in the middle. This is, as mentioned, headed to be about hedonistic or semi-proper nature-environmental ethical positions. Here self-conscious mammals are put together with birds, reptiles, amphibians, and maybe fishes and some invertebrates as possible candidates for being ascribed a direct moral status value that might qualify for moral stakeholder status, and thus have a universal inner worth. If they are ascribed a direct moral status value that would not under any circumstances allow the animals to be killed, except if they pose threats to humans, then the ethics applied should be termed semi-proper nature-environmental. If these animals might be killed or slaughtered painlessly for food, however, then this represents a weaker version of the hedonistic nature-environmental ethical position.

For the rest of the ecological entities, it is noted that they might have particular inner worth or purely instrumental value only. These entities are certain invertebrates, all plants, ...
microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems, and again maybe fishes

The left column with the traditional inter-human ethics is unchanged.

**Side comments to Goodpaster – relevance of the conceptual model**

One side comment to Goodpaster’s ethics related to the relevance of the conceptual model concerns the blurred borderline between universal and particular inner worth.

**Universal and particular inner worth – blurred borderline**

This comment, related to the distinction between intelligibility and normative substances of ethics, concerns especially the notion that metaethics has always been a partially normative discipline. The reference to times and societies in which it might be argued that the moral standing of blacks, women and children was deniable on conceptual grounds addresses the challenge of searching for some universal value-conferring properties for ascribing direct moral status value. It also creates awareness of the possibilities that candidates for such properties might be particularly related to certain times, groups or individuals, rather than being genuinely universal. The substantive status versus the pure logical status of ethics illustrates the difficulties of clearly defining potentially value-conferring properties for the universal inner worth of ecological entities. This addresses again, as mentioned in connection with Regan, the blurred borderline between universal and particular inner worth.

**Side comments to Goodpaster – issues related to ecological literacy**

Side comments to Goodpaster’s ethics related to ecological literacy are linked to his notions about sensitivity and awareness.

**Ecological literacy – knowledge and care parts?**

When Goodpaster emphasises that the regulative character of the moral consideration ascribable to all living things calls for sensitivity and awareness, he slightly touches, I think, upon the knowledge and care parts of ecological literacy as a basis for attitudes, world views and ethics in the field of the environment. This might indicate that also Goodpaster’s ethics in practice involve ecological literacy as a basis for attaining sound environmental ethical judgements.
Supra-individual ecological entities – *basis for being alive*

Depending on how much ecological literacy plays a role, it is also conceivable for Goodpaster’s ethics, as it is for Regan’s and the strong anthropocentric ethics, that the ethics might tend towards the anthropocentric functional or the anthropocentric structural ecosystem aspect of sustainability. This might then, as I see it, be a basis for securing that living organisms can be alive. Since Goodpaster restricts his ethics to all living things, it is less conceivable that his ethics, contrary to what I said for Regan’s ethics, might tend towards the nonanthropocentric structural ecosystem aspect of sustainability.

### 5.3.4 Taylor – *biocentric outlook on nature*

Taylor, the last of the four biocentric authors, argues that all wild organisms have equal inherent worth (Callicott 1998a p.11-12). Callicott says that Taylor agrees with Goodpaster that all living things have interests and thus a good of their own. Taylor (2001 p.100) argues for a life-centred system of environmental ethics. He maintains that a certain ultimate moral attitude of respect for nature has a central place in the foundation of such an ethics. Pojman (2001 p.100) understands this to be a further development of Albert Schweitzer’s life-centred system of environmental ethics. Taylor argues, Pojman says, that each living individual has a teleological centre of life. This means that it pursues its own good in its own way, and possesses equal inherent worth. Human beings are therefore according to Taylor, Pojman says further, no more intrinsically valuable than any other living thing, but should see themselves as equal members of Earth’s community.

In designating his theory to be set forth as life-centred, Taylor (2001 p.101) intends to contrast it with all anthropocentric views. He describes anthropocentric views as holding that human actions affecting nonhumans are right as long as they are favourable to human well-being or consistent with norms that protect human rights. Taylor says that his theory is life-centred because it states that humans are morally bound to protect or promote the good of wild plants and animals for their own sake. By this he means that such obligations are due those living things out of the recognition of their inherent worth. Our duties to respect the integrity of natural ecosystems, to preserve endangered species, and to avoid environmental pollution stem therefore, Taylor explains, from the fact that these are ways in which we can help make it possible for wild species to maintain a healthy existence. Though Taylor (1998 p.73) limits his discussion to wild organisms, species, communities and natural ecosystems, he is not
denying that domesticated living things do have a good of their own in the same sense as wild plants and animals.

Taylor (2001 p.104-105) says that his life-centred system of environmental ethics is made up of three basic elements. These are a belief system, an ultimate moral attitude of respect for nature, and a set of rules of duty and standards of character. They are connected, he explains, so that the belief system provides a biocentric outlook on nature which supports and makes intelligible an autonomous agent’s adopting the ultimate moral attitude of respect for nature. As a consequence of this, a moral commitment is made to abide by a set of rules of duty and to fulfil certain standards of good character. He (ibid. p.103) explains that the attitude is ultimate because it is not derived from any higher norm, and it is moral because it is understood to be disinterested in the sense that it is not dependant on a set of feelings that comprise love for nature. It is therefore not about particular, affectionate feelings, but a universalisable attitude, Taylor says.

**Ultimate moral attitude – good of a living thing and inherent worth**

To be able to justify the acceptance of a life-centred system of ethical principles, Taylor asserts that it first is necessary to make clear the ultimate moral attitude of respect for nature that underlies the commitment to live by such a system. Then it is necessary to examine the considerations that would justify any rational agent’s adopting that moral attitude. Two concepts are, according to Taylor, essential for the ultimate moral attitude of respect for nature. One is that of the good of a living thing, and the other is the idea of inherent worth. He explains that we can think of the good of a living thing as consisting of the full development of its biological powers. The good of populations or communities thus consists, Taylor argues, in them maintaining themselves as coherent systems of related organisms whose average good is at an optimum level for the given environment. The idea of a being having a good of its own, he says, does not entail that the being must take an interest in what affects its life for better or worse. As an example, he mentions that a tree probably has no knowledge, desires or feelings, but it can be harmed or benefited by our actions. Taylor emphasises therefore that when constructed this way, the concept of a being’s good is not coextensive with sentience or the capacity for feeling pain (Taylor 2001 p.101-102).

With regard to inherent worth, Taylor says that this involves the principle of moral consideration and the principle of intrinsic value. By moral consideration he means that the
good of living things must be taken into account whenever it is affected for better or worse by the conduct of rational agents. The principle of intrinsic value means that the good of a living thing is worthy of being promoted as intrinsically valuable, as an end in itself, and for the sake of the entity whose good it is (ibid. p.102).

Belief system – permanent disposition and biocentric outlook

On the basis of this clarification of the ultimate moral attitude of respect for nature, Taylor moves to the second part of the justification of the acceptance of a life-centred system of ethical principles. This he does by examining the considerations that would justify any rational agent’s adopting the moral attitude. The basic question in this respect, Taylor says, is why moral agents should regard nonhumans as possessing inherent worth. His logic is that if moral agents subscribe to the principles of moral consideration and intrinsic value, which constitutes the inherent worth, then they are adopting the ultimate moral attitude of respect for nature. Anyone who does adopt this disinterested and universalisable moral attitude has, according to Taylor, a more or less permanent disposition. He describes that this disposition comprises (1) to seek the good of natural entities, (2) to consider this to be obligatory, and (3) to have feelings towards what is favourable and unfavourable to these entities (Taylor 2001 p.103).

If there are good reasons for adopting the moral attitude of respect for nature, Taylor argues, then these reasons would justify anyone that has the three dispositions to adopt the attitude. This is because anyone that has the three dispositions would be committed to the principles of moral consideration and intrinsic value, and thereby justified regarding wild creatures as possessing inherent worth (ibid. p.103-4).

The way Taylor seeks for good reasons to adopt the ultimate moral attitude is by the way we view living things and how we understand the relations that humans bear to them. Underlying the ultimate moral attitude of respect for nature is, Taylor states, a certain belief system that constitutes a particular world view or outlook on nature, and the place of human life in it. If it appears that the belief system is internally coherent and well-ordered, and if it is consistent with all known scientific truths relevant to our knowledge of the objective of the moral attitude, then, Taylor says, there remains the task of indicating why scientifically informed and rational thinkers with a developed capacity of reality awareness can find it acceptable as a way of conceiving of the natural world and our place in it. Taylor does not hold that such a
belief system can be proven to be true, but as a whole, he contends, it would constitute a coherent, unified and rationally acceptable picture of a total world. By examining each of its main components and seeing how they fit together, Taylor believes that a scientifically informed and well-ordered conception of nature and the place of humans in it can be obtained. He says that the belief system, which he calls ‘the biocentric outlook on nature’, might best be described as a philosophical world view. However, it is grounded on ‘the great lesson we have learned from the science of ecology’, as Taylor expresses it. This lesson, he asserts, is about the interdependence of all living things, organised or sustained in an organically unified order whose balance and stability are necessary conditions for the realisation of the good of its constituent biotic community (ibid. p.104).

**Biocentric outlook – Earth’s community of life, complex organic system, teleological centre of life, denial of human superiority**

Taylor describes the biocentric outlook on nature to have four main components. The first is that humans are thought of as members of the Earth’s community of life. The other is that the natural world is seen as an organic system with a complex web of interconnected elements. It is here that the science of ecology, as mentioned above, has taught us a lesson. The third is that each individual organism is conceived of as a teleological centre of life pursuing its own good in its own way. The fourth component, which Taylor denotes as the single most important, is the denial of human superiority (Taylor 2001 p.105).

**First component – Earth’s community of life**

In connection with the first component of a biocentric outlook on nature, Taylor comments that we should not deny the differences between humans and other species, but it should be kept in mind that humans are only one species among many. He holds that each species has a good of its own, and that the good of humans can no more be realised than the good of nonhumans without the biological necessities for survival and physical health. Taylor emphasises that humans are relative newcomers on Earth and that the good of nonhumans is not dependant on the existence of humans. It is rather so, he mentions, that many species actually would be greatly benefited if humans disappeared form the face of the Earth (Taylor 1998 p.75-77).
Second component – *natural world is a complex organic system*

The second component is about a holistic view, where Taylor’s concern is the knowledge about the ecological dynamics and complexity. He says that when nature is viewed from the perspective of the biocentric outlook, one never forgets that in the long run the integrity of the biosphere is essential to the realisation of the good of both humans and nonhumans. He points out that the holistic view is about the factual aspect of biological reality, and does not itself constitute a moral norm. The ethical implications, he explains, lay entirely in the fact that knowledge of the biological reality is an essential means to fulfil the aims set for adopting the attitude of respect for nature. He adds that this also makes the adopting of that attitude both rational and intelligible (ibid. p.77).

Third component – *teleological centre of life*

Besides the increased ecological knowledge of the interrelation between species in nature, Taylor believes that this understanding also develops a sharpened awareness of the uniqueness of each individual organism. The culmination of this is the conceiving of each individual as what he calls a teleological centre of life, by which one is able to look at the world from its perspective. This grasping of the particularity of an organism as a teleological centre of life, striving to preserve itself and to realise its own good in its own unique way, is the third component of the biocentric outlook. Taylor is careful to address that this is not about anthropomorphising and reading human characteristics into nonhumans, and that it is not even necessary to have consciousness to be a teleological centre of life (ibid. p.77-79).

Fourth component – *denial of humans’ superiority*

Then comes the fourth component, which Taylor perceives to be the single most important component in the biocentric outlook on nature, namely the denial of humans’ superiority. Because various nonhuman species have capacities that humans lack, Taylor hold that the claim to human superiority would be rejected from a nonhuman standpoint. He distinguishes between judgements of merit and judgements of inner worth. A human could be judged to be better than or superior to another from the moral point of view by applying certain standards to their character and conduct. Similarly, Taylor explains, we could appeal to nonmoral criteria in judging someone to be an excellent piano player, a fair cook or a poor tennis player. All these are merits that will be judged according to human standards and values. Therefore, like the other biocentric philosophers, Taylor asks why standards that are based on human values should be assumed to be the only valid criteria of merit. If nonhumans have a good of
their own, it rather makes sense to judge their merits by standards derived from their good, he comments. As a consequence of this, Taylor states that it is conceptually incoherent to judge humans as superior to nonhumans on the ground that humans have moral capacities while nonhumans have not (ibid. p.79-81).

In the further discussion of human superiority, Taylor moves from merits to inherent worth. He says that inherent worth does not depend on an entity’s merits, but is about placing intrinsic value on the realisation of an individual's good. In human affairs, he says, we are all familiar with the principle that one’s worth as a person does not vary with one’s merits. The same can hold true of animals and plants, he contends. Taylor wants to argue against the belief that humans should be regarded to be superior in inherent worth to all other species. Similar again to the other biocentric philosophers, he holds that the philosophical traditions leave us with one ground for asserting that a human, regardless of merit, is a higher kind of entity than any other living thing. This ground, he says, is ‘the mere fact of the genetic makeup of the species Homo sapiens’. Why, he asks, should the arbitrary arrangement of genes of a certain type be a mark of superior value? This appears to be nothing more than a ‘deep-seated prejudice’, Taylor argues, when we look at our relation to other species in the light of the first three elements of the biocentric outlook. Those elements give a view of the natural world and of the place of humans in it, where humans and nonhumans are viewed together as integral parts of one unified whole, Taylor explains. He concludes that the biocentric outlook recommends itself as an acceptable system of concepts and beliefs to anyone who has ‘developed capacity of reality awareness with regard to the lives of individual organisms’ (ibid. p.81-85).

**Rules of duty – standards of character**

Finally, some comments are in order regarding the rules of duty and fulfilment of certain standards of good character that Taylor refers to as consequences of the moral commitment of his environmental ethics.

**Four rules of duty – nonmaleficence, non-interference, fidelity, restitutive justice**

Taylor describes four rules of duty. The first is the rule of nonmaleficence. This is the duty not to do harm to any ecological entity that has a good of its own. Next is the rule of non-interference. Under this rule fall two negative duties, namely to refrain from restricting the freedom of individuals and to generally avoid interfering with individual as well as supra-
individual ecological entities. Third is the rule of fidelity, which basically is not to break the trust that wild animals place in us. The last rule, concerning restitutive justice, imposes the duty to restore the balance of justice between a moral agent and a moral subject when the subject has been wronged by the agent (Taylor 1993 p.357-358).

Five priority principles – self-defence proportionality, minimum wrong, distributive justice, restitutive justice
In addition, Taylor suggests five priority principles for the fair resolution of conflict claims. These are the principles of self-defence, proportionality, minimum wrong, distributive justice and again the issue of restitutive justice. The principles of self-defence state that it is permissible for moral agents to protect themselves against dangerous or harmful organisms by destroying them. This is parallel with Regan’s statement that it sometimes can be justified to override the animals’ rights if the animals pose threats to humans. The four other principles apply to situations where the nonhuman organisms involved are harmless. In relation to these principles, a distinction is made between basic and non-basic interests. Basic interests, Taylor says, are what rational and factually enlightened people would value as an essential part of their very existence as persons. This includes subsistence, security, autonomy and liberty, which he refers to as universal values. In contrast to this are the particular non-basic interests that vary from person to person. As examples of such non-basic interests, Taylor mentions all kinds of sports hunting and recreational fishing which are done as an enjoyable pastime, and where the animals killed are not necessarily eaten. Other examples of non-basic interests that Taylor mentions are the exploitation of natural habitats to build airports, roads, art museums, libraries, hydropower projects, timber plantations and landscaping in making public parks (ibid. p.359-363).

Taylor says that the principle of proportionality and the principle of minimum wrong apply to cases in which there is a conflict between the basic interests of animals or plants, and the non-basic interests of humans. The principle of proportionality prohibits humans from allowing their non-basic interests to override the basic interests of the animals and plants. The principle of minimum wrong applies to situations where humans’ non-basic interests actually may outweigh undesirable consequences for wildlife. The condition for applying this principle is that the humans have adopted the moral attitude of respect for nature, Taylor explains. The principle of distributive justice covers conflicts where the interests of all parties are basic. All parties should then be allotted an equal share of natural sources of good that can be used for
the benefit of any of the parties. The most obvious clash between the basic interests that can arise, Taylor says, is when humans have a necessity to consume nonhumans as food. In such circumstances the principle entails that it is morally permissible for humans to kill wild animals for food if that is necessary for their survival. Taylor concludes that since animals are not of greater worth, there is no obligation to further their interests at the cost of the basic interests of humans. The principle of restitutive justice, finally, applies only in the past when the principles of minimum wrong or distributive justice have been used. This is to secure that some form of reparation or compensation is called for in relation to the harm done to plants and animals (ibid. p.363-367).

**Value-conferring properties – teleological centre of life**

Taylor’s life-centred system of environmental ethics may, akin to Goodpaster’s life principle of being alive, be interpreted to mean that a necessary and perhaps also sufficient value-conferring property for ascribing direct moral status value is simply being alive. Again this has some similarities with Rolston’s (1988 p.23-25) notion that life, as one of the rarest things in the universe, should by itself be a good reason to prove it of interest. When Taylor conceives of each living individual having a teleological centre of life, he sees them as striving to realise their own good in their own unique ways, and as possessing equal inherent worth. Viewed in this way, a teleological centre of life might be considered as a structural value-conferring property, in the same way as Goodpaster’s criterion of being alive. Taylor adds that human beings are no more intrinsically valuable than any other living thing, but should see themselves as equal members of Earth’s community. The only exception is that Taylor, just like Regan, says that it is permissible for moral agents to protect themselves in self-defence against dangerous or harmful organisms by destroying them. All this together entails that Taylor’s ethics, on the same basis as for Goodpaster’s life-centred ethics, might be characterised as representing a proper nature-environmental ethical position.

However, just as Goodpaster and Regan, Taylor also evidences value differentiations or grading when he discusses how his ethical theory might be applied in real-life situations. Taylor is more specific and detailed about this than Goodpaster and Regan, when he talks about the set of rules of duty and standards of character that follow as a consequence of the ultimate moral attitude of respect for nature. Some of these rules and standards seem to be ethically acceptable on the ground that they are favourable to human well-being. This is an interesting observation, since Taylor strongly denies human superiority and emphasises that
his life-centred system of environmental ethics intends to contrast all anthropocentric views. It is when Taylor presents the five principles for fair resolution of conflict claims, were the more pragmatic and practical implications are exposed. What appear are some differences in the moral duties towards humans and nonhumans. This is specifically so in connection with the principle of minimum wrong and the principle of distributive justice.

**Grading of direct moral status value? – principle of minimum wrong**

The principle of minimum wrong allows non-basic human interests to outweigh undesirable consequences for wildlife. Taylor emphasises, though, that this should be done in a context where humans have adopted the moral attitude of respect for nature. If the end result of this respect had been that any undesirable consequences for wildlife would be ethically unacceptable, then there actually would not be any need for the principle of minimum wrong. The principles of proportionality, which outright prohibit humans from allowing their non-basic interests to override the basic interests of the animals and plants, would then be sufficient. The reason why the principle of minimum wrong is presented might therefore be that Taylor, despite everything, means that human interests in certain situations should be given priority. In the practical context of the present investigation, it is difficult to understand this other than that some grading of direct moral status value is necessary. This might be in the sense that humans’ needs and preferences have priority because humans are ascribed a kind of direct moral status value that is higher than nonhumans’. The moral attitude of respect for nature might in this context have some moderating effect, but it gives no security for nonhuman interest.

**Grading of direct moral status value? – principle of distributive justice**

The principle of distributive justice says that all parties should, with regard to basic needs, be allotted an equal share of natural sources that can be used for the benefit of any of the parties. The problem with this principle is that the understanding or specification of human basic interests is, according to Taylor, dependent on what rational and factually enlightened people would value as an essential part of their very existence as persons. This goes beyond the basic life support needs for food and shelter within the biological domain to secure survival, growth and reproduction. It includes also, Taylor says, what is necessary to make a meaningful and worthwhile human life. Taylor seems here to address values of the particular inner worth category within the cultural domain, which in the present investigation are understood to contribute to humans’ cultural flourishing. Further, it also seems that Taylor’s description of
basic interests has similarities with Perman et al.’s statement in Chapter 4 (Sustainability Context – contemporary perceptions), saying that it is now widely agreed that the poverty line is culturally rather than biologically determined.

In connection with the above description of basic interests, Taylor maintains that the most obvious clash is when humans have a necessity to consume nonhumans as food. In such situations, the principle entails that it is morally permissible for humans to kill wild animals for food if that is necessary for their survival. Taylor concludes that animals are not of greater worth, so there is no obligation to further their interests at the cost of the basic interests of humans. If this had been restricted to basic life support needs of the biological domain, as this is described in the flourishing matrix, then the position might be characterised as proper nature-environmental ethics. However, with the relatively wide understanding or specification of human basic interests given by Taylor, the consistency with proper nature-environmental ethical positions is more questionable. In this sense, it tends again more towards some kind of grading of direct moral status value.

Practical situations – proper nature-environmental ethics?
By this, it seems that Taylor in his considerations about practical ethics, just like Regan and Goodpaster, gives animals less priority or less worth than humans. This gives the impression that biocentric ethics, when applied in practical situations, do not fully work as proper nature-environmental ethics. One thing is that animals are given less worth. Another is that the practical ethical judgements are dependent on certain attitudes or world views that are based on ecological knowledge. This is addressed further in the side comments.

When Taylor’s ethics are combined with Goodpaster’s, Regan’s and Singer’s biocentric ethics and the strong anthropocentric ethics, it in principle adds only the notion of teleological centres of life to the proposed value-conferring properties of the inner worth table, as shown in mind photo 5.5.

The only change in the inner worth table is therefore that the notion of a teleological centre of life is added to the value-conferring properties. The sorting of ecological entities in relation to the three ethical positions and the three value rows remains unchanged.
### Inner worth of ecological entities – Taylor’s ethics

*(Strong anthropocentric ethics, and biocentric ethics by Singer, Regan, Goodpaster and Taylor)*

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Traditional inter-human ethics</th>
<th>Hedonistic or semi-proper nature-environmental ethics</th>
<th>Proper nature-environmental ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed value-conferring properties</td>
<td>Rationality</td>
<td>Self-consciousness, consciousness, sentience</td>
<td>Being alive, teleological centre of life</td>
</tr>
<tr>
<td>Ecological entities with possible universal inner worth,</td>
<td>None</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses</td>
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<tr>
<td>Life domain</td>
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<tr>
<td>Direct moral status value</td>
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<td>that might qualify for</td>
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<tr>
<td>moral stakeholder status</td>
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<td></td>
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<tr>
<td>or no universal inner worth,</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>but particular inner worth,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreational values</td>
<td></td>
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<tr>
<td>Aesthetic values</td>
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<tr>
<td>Scientific values</td>
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<tr>
<td>Evolutionary values</td>
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<tr>
<td>Symbolic values</td>
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<tr>
<td>Religious values</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth,</td>
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</tr>
<tr>
<td>but purely instrumental value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological domain</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Life support values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic values</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Side comments to Taylor – relevance of the conceptual model

There are two side comments related to the relevance of the conceptual model. One concerns the very cognitive ground of the notion of inner worth. The other is about particular and universal valuations.

**Inner worth – future of humans or nature**

In connection with the comments above, it might be useful to emphasise, as Taylor does, that many species actually would be greatly benefited if humans disappeared from the face of the Earth. This means that if the primary goal of environmental ethics is to secure biodiversity and nature as such as ends in themselves, then humans represent only one species among many, which for the benefit of the whole could then just as well disappear. Though this tends towards what Regan calls environmental fascism, it is an important recognition in relation to whether environmental ethical theories, at their very bases or philosophical grounds, should be interpreted to be concerned primarily with the future of humans or the future of nature as
such. This concerns the very cognitive ground of the understanding of inner worth, especially universal inner worth, as this is used in the inner worth table.

**Particular versus universal – inner worth**

Taylor states that one of the elements of his life-centred system of environmental ethics is a belief system noted as an ultimate moral attitude of respect for nature. He explains that the moral attitude is ultimate because it is not derived from any higher norm, and it is moral because it is disinterested in the sense that it does not depend on a set of feelings that comprise love for nature. It is therefore not about particular, affectionate feelings, but a universalisable attitude. This resembles the distinction made between particular inner worth and universal inner worth in the inner worth table.

**Side comments to Taylor – issues for the judgements of ethical records**

Two side comments concerns the judgements of ethical records. One is about distributive and restitutive justice, which resemble equity and substitutability, and one is about basic and non-basic needs.

**Equity and substitutability – distributive and restitutive justice**

Among the five priority principles for the fair resolution of conflict claims, Taylor mentions distributive justice and restitutive justice. The principle of distributive justice is similar to the fair distribution part of the Equity Principle of the framework for the discussion of moral duties, as described in Chapter 4 (Sustainability Context – contemporary perceptions). This is when Taylor contends that all parties should be allotted an equal share of natural sources of good that can be used for the benefit of any of the parties. The principle of restitutive justice has similarities with the substitutability part of the framework for the discussion of moral duties. This is in the sense that it is about restoring the balance of justice by securing that some form of reparation or compensation is called for in relation to the harm done.

**Basic and nonbasic needs – full development of biological powers**

Taylor says that we can think of the good of a living thing as consisting in the full development of its biological powers. This gives associations to the notions of flourishing potential used in connection with the flourishing matrix. Reinforcing this is Taylor’s references to basic and non-basic interests. Much like how it is described for the flourishing matrix, Taylor says that basic interests, such as subsistence and security, are essential to the
very existence of persons, while non-basic interests vary from person to person. His examples of such non-basic interests include enjoyable hunting and fishing, and the exploitation of natural habitats to build airports, roads, art museums, libraries, hydropower projects, timber plantations and landscaping in making public parks. This supports the relevance of distinguishing between basic and non-basic or luxury needs and preferences, such as it is decided for the judgements of ethical records in the case study.

**Side comments to Taylor – issues related to ecological literacy**

Since Taylor's biocentric outlook on nature and the moral attitude of respect for nature seem very much to depend on ecological knowledge, some side comments will be given both to ecological literacy as such, supra-individual ecological entities and the role of science.

**Ecological literacy – knowledge and care as bases for moral attitude and world view**

When Taylor says that biological knowledge is an essential means to fulfil the aims set for adopting the attitude of respect for nature, it sounds like he talks about the knowledge part of ecological literacy. This is strengthened when he also emphasises that the adopting of the moral attitude of respect for nature is both rational and intelligible. Linked to this is his trust in the moral judgements of people who he refers to as rational and factually enlightened. Additionally, he seem to refer to the care part when he holds that anyone who does adopt the moral attitude of respect for nature has feelings towards what is favourable and unfavourable to ecological entities. All this together points towards a conclusion, I think, that ecological literacy represent a necessary basis for the moral attitude that Taylor builds his environmental ethics on. Related to the Sustainability Context, I perceive ecological literacy the way it works here to have a bearing both on the Ecological Element and the Cultural Element.

Taylor contends further that the biocentric outlook on nature should be consistent with all known scientific truths relevant to our knowledge of the objective of the moral attitude. It should be so that scientifically informed and rational thinkers with a developed capacity of reality awareness can find it acceptable as a way of conceiving of the natural world and our place in it. He acknowledges that such a belief system cannot be proven to be true, but that it as a whole would constitute a coherent, unified and rationally acceptable picture of a total world. It is tempting to interpret him to believe that this ultimately will result in a mutually accepted environmental ethics that expand universal inner worth to all ecological entities being alive. This will in case have some linkages with Westra’s statement mentioned in
Chapter 4 (Sustainability Context – *contemporary perceptions*), that the principle of integrity would be effective by proposing a goal that is universally acceptable for the environmental standpoint.

**Supra-individual ecological – nonanthropocentric structural ecosystem aspect of sustainability?**

Taylor, like Regan, addresses the question of the possible inherent value of supra-individual ecological entities, such as ecosystems, and indicates that this might be ensured by respecting the rights of the individuals. Taylor explains that the good of populations or communities thus consists in them maintaining themselves as coherent systems of related organisms whose average good is at an optimum level for the given environment. By this also Taylor seems to tend towards the anthropocentric functional and structural ecosystem aspects of sustainability with focus both on particular ecosystem services and evolutionary abilities. Different from Regan is that Taylor explicitly extends universal inner worth to all living individual ecological entities, and thus quite certainly, I believe, would support the anthropocentric structural ecosystem aspect and the focus on evolutionary abilities.

It is further also possible that Taylor would agree that ecological literacy ultimately might end with a perception that accepts the nonanthropocentric structural ecosystem aspect of sustainability. I think here specifically of his notion that our duties to respect the integrity of natural ecosystems stem from the fact that this is a way in which we can help make it possible for wild species to maintain a healthy existence.

**Role of science – the great lesson**

When Taylor in addition to being consistent with all known scientific truths, says that the biocentric outlook on nature is grounded on ‘the great lesson we have learned from the science of ecology’, this should justify the relevance of the role of biological science in relation to Taylor’s ethics. I think here specifically of the role of science in the two-way relation between the Ecological Element and the Cultural Element, as this is described in Chapter 4 (Sustainability Context – *contemporary perceptions*).
5.3.5 Inner worth table so far – *strong anthropocentric and biocentric ethics*

Mind photo 5.6 shows how I, based on the search for value-conferring properties within the strong anthropocentric and biocentric ethics, have decided to present the inner worth table before the search continues within ecocentric and weak anthropocentric ethics.

### Mind photo 5.6 Inner worth table – *strong anthropocentric ethics and biocentric ethics*

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Proposed value-conferring properties</th>
<th>Possible degrees of direct moral status value</th>
<th>Ecological entities with possible universal inner worth, Life domain</th>
<th>or no universal inner worth, but particular inner worth, Cultural domain</th>
<th>or no universal inner worth, but purely instrumental value, Biological domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional inter-human ethics</td>
<td>Rationality</td>
<td>Equivalent with ‘humans’</td>
<td>None</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
<td>Same as above</td>
</tr>
<tr>
<td>Hedonistic or semi-proper nature-environmental ethics</td>
<td>Self-consciousness, consciousness, sentence</td>
<td>Less than ‘humans’</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses</td>
<td>Fishes(?), invertebrates, plants, microorganisms like bacteria and viruses, and supra-individual ecological entities such as species and ecosystems</td>
<td>Same as above</td>
</tr>
<tr>
<td>Proper nature-environmental ethics</td>
<td>Being alive</td>
<td>Distinctly less than ‘humans’</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria and viruses</td>
<td>Supra-individual ecological entities such as species and ecosystems</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

Apart from one major and two minor change, no other changes are done to the inner worth table after adding “teleological centre of life” as a value-conferring property on the basis of Taylor’s ethical theory. The first minor change is to shorten the notion in brackets under the heading of the inner worth table, which is now written “Strong anthropocentric and biocentric ethics”. The other minor change is that I use only the notion “being alive” for the value-conferring properties based on Goodpaster’s and Taylor’s life-centred ethics. This means that being alive from now on refers just as much to Taylor’s notion of a teleological centre of life as to Goodpaster’s being alive.
The major change is the new row indicating possible degrees of direct moral status value. This describes, as mentioned in Chapter 3 (Method – *a post-normal science approach*), how the different value-conferring properties might be used to ascribe different degrees of direct moral status values if humans are said to have the highest degree. This row will be used to identify which ecological entities might qualify for moral stakeholder status in practical judgements of ethical records, such as in the case study.

A further discussion of grading of direct moral status value is done in the following subsection. Next is a subsection about how to read the inner worth table on the basis of the strong anthropocentric ethics and the biocentric ethics. This is followed by three subsections with summaries of the side comments given so far.

**How the inner worth table is organised – *degrees of direct moral status value*?**

This subsection first discusses the grading of direct moral status value in relation to humans’ direct moral status value, before arguing why such grading might be a reasonable solution for real-life situations.

**Moral stakeholder status – *decide by direct moral status value relative to humans*”?**

Though the biocentric theories differ with regard to what might be value-conferring properties for ascribing direct moral status value, they seem to have similarities in the practical application of such properties. All four biocentric authors notice that nonhumans in certain real-life situations should be given less priority and be ascribed less worth than humans. This holds specifically for situations where animals are threatening humans, or when humans need animals for food to secure survival. It might also be accepted in relation to other aspects of human flourishing that humans have priority because they have more worth. An example of this is when Taylor says that there is no obligation to further animals’ interests at the cost of the basic interests of humans. He adds that these interests go beyond the basic life support needs and includes what is necessary to make a meaningful and worthwhile life.

The acknowledgements or recognitions that humans in certain real-life situations have more worth than nonhumans, are what I use as the basis for suggesting a grading of direct moral status value. My suggestion is to use the value-conferring properties described in the inner worth table for such a grading. I find it reasonable to do so because it seems that all four
biocentric authors, when describing how to handle real-life situations, tend to lean on rationality, sentience and non-sentience to explain why humans may have more worth than nonhumans. This is, as Regan (1979 p.206-207) expresses it, not to suggest something that is totally without philosophical roots. Grading of direct moral status values on the basis of the value-conferring properties will then represent a scale for deciding which ecological entities might qualify for moral stakeholder status. This is a grading measured in relation to humans’ direct moral status value, as shown in the new row of the inner worth table, where the degree of direct moral status value is given in terms of being equivalent with, less than or distinctly less than humans’.

Degree of direct moral status value – solution for practical ethics?
Grading the inner worth of nonhuman beings this way might seem to undermine the whole idea behind the biocentric ethical theories. Such a reflection might be right on the conceptual level, but since the biocentric authors, when trying to adjust their theories to real-life situations, tend to lean on properties such as rationality and sentience, I find it reasonable to do the same. Regan is the one who most clearly submits the whole range of value-conferring properties used in the inner worth table as possible alternative conditions for the attribution of inherent value.

This kind of thinking or solution is supported by Callicott (2002 p.8-9), who maintains that all organisms could be granted a baseline or minimal intrinsic value. This should at least imply that when humans’ interests are not at stake, the organisms should be left alone ‘to pursue their own ends, to realise their own teloi, each in its own way’. On top of this, Callicott says with reference to Rolston, additional intrinsic value could be distributed or ascribed to sentient organisms, yet more to ‘subject-of-a-life organisms’ and more still to rational organisms.

Similar to my comment about undermining the whole idea behind the biocentric ethical theories, Callicott (ibid. p.9) says that the grading of intrinsic value might seem rather conventional, since it still leaves humans on top of the moral pyramid. By being in this position, humans are entitled to defend their high degree of intrinsic value and cater it by utilising and if necessary harming organisms with less intrinsic value. There is, however, a difference, Callicott (ibid. p.8-9) explains. The pyramid representing the traditional Western ethics is low, with basically two levels. Humans are at the top level, with non-humans in a bunch underneath, considered as mere things with no intrinsic value at all. The grading of
intrinsic value makes the biocentric pyramid higher, with a number of layers and differential intrinsic value ascriptions. Though this still leaves humans at the pinnacle, it implies a duty to consider non-humans not only instrumentally, Callicott concludes. I see this as support to introduce grading of direct moral status value in relation to humans’ direct moral status value as a reasonable way of handling real-life situations in the context of biocentric ethics.

**How to read the inner worth table – the columns in the inner worth table**

On the basis of the new row in the inner worth table, regarding the degrees of direct moral status value, the following is a description of how to read or understand the three columns in the inner worth table containing the different ethical positions, namely traditional inter-human ethics, hedonistic or semi-proper nature-environmental ethics and proper nature-environmental ethics.

The column to the left – *traditional inter-human ethics*

The easiest of the ethical positions to explain is the traditional inter-human ethics in the left column of the inner worth table. This represents the situations where no ecological entities are ascribed a direct moral status value that qualifies for moral stakeholder status. Only humans qualify for moral stakeholder status. This means that all individual humans should be treated well and none should normally be killed. The only exception might be in warfare situations and in situations where killing in self-defence might be necessary to secure survival. Judgements of ethical records, such as those in the case study, are thus about humans’ needs and preferences only. Values behind biodiversity are then either of particular inner worth or purely instrumental. This means that individual ecological entities such as wild and farmed salmon have no universal inner worth, and are valued either as entities with particular inner worth or purely instrumentally.

The ethical positions representing the traditional inter-human ethics are those referred to as strong anthropocentric ethics.

The column to the right – *proper nature-environmental ethics*

The next ethical position, which also is relatively easy to explain, is the proper nature-environmental ethics in the right column. This represents the situation where all individual ecological entities have a universal inner worth based on being alive as the value-conferring property. They are by this ascribed a direct moral status value that qualifies for a moral
stakeholder status. This means that they should be treated well, their needs and preferences should be cared for on an equity basis, and none should normally be killed. One exception with regard to killing might, as with traditional inter-human ethics, be for survival purposes in self-defence, whether this is due to threats or the need for food.

This represents, as mentioned in connection with Regan’s ethical theory, an obligation not to treat an ecological entity only as a means, but to treat it with respect, independent of other interests in that entity. This is, as mentioned, similar to Kant’s formula saying that humanity should always be used as an end, and never merely as means. Traditional inter-human ethics should therefore be considered as a part of or an element within the proper nature-environmental ethics.

The problem with the proper nature-environmental ethics, as demonstrated by all the practical reservations and adjustments described by the biocentric authors, is, as Goodpaster expresses it, the difficulties of living in accordance with it. The main such difficulty, compared to the context of the traditional inter-human ethics, is that there might be far less values behind biodiversity available to support all aspects of human flourishing. This is both because available goods and resources should be shared on an equity basis between all individual ecological entities, and because no individual ecological entities should be used merely as means.

Linked to this, Callicott (2002 p.8) comments that biocentric approaches face the challenge that they too broadly distribute intrinsic value to each and every organism, which means that moral considerability should be granted to all of them. This makes the ethical space ‘too densely crowded’, and many human activities, such as eating something, weeding a flower garden, getting rid of vermin and even slapping mosquitoes, all become morally questionable. We might be able to handle some of this, Callicott says, by avoiding the harming and maltreatment of animals for amusement and unnecessary experimentations or other activities. Equally possible, he says further, is that we might be able to give up eating meat and using other products made from sentient beings. But still, he concludes, the list of morally questionable human activities would be long if all organisms have intrinsic value.

Goodpaster’s and Taylor’s ethical theories represent the proper nature-environmental ethical position, where all kinds of individual ecological entities, on the basis of the “being alive”
type of value-conferring property, qualify for moral stakeholder status. This might be referred to as the strong version of Goodpaster’s and Taylor’s ethical theories.

**The column in the middle – hedonistic nature-environmental or semi-proper nature-environmental ethics**

The column in the middle, representing the hedonistic or semi-proper nature-environmental ethical positions, is more complicated to explain. The best way is to start from the proper nature-environmental ethical side, where all individual ecological entities should be treated well and none should be killed, except maybe for the purpose of human survival. Related to this, the semi-proper nature-environmental ethics restricts the moral duty to care for the survival, growth and reproduction of a selection of individual ecological entities only. This involves also the prohibition of killing. Such a selection will be based on the degree of direct moral status value. One reasonable restriction among ecological entities being alive might be, as indicated in the inner worth table, to say that those which are sentient and conscious qualify for a moral stakeholder status, and thus should normally not be killed.

The semi-proper nature-environmental ethics might be restricted even further, by restricting moral stakeholder status to self-conscious animals. This means that mammals only would qualify for moral stakeholder status. Though this appears as a very weak version of proper nature-environmental ethics, it might still be termed semi-proper, because it entails that it would be ethically wrong to kill mammals for other purposes than in self-defence.

Moving on, then, to the hedonistic nature-environmental ethics, one strong and one weak version may be described. The stronger version of the hedonistic nature-environmental ethics is an ethics where all sentient animals qualify for moral stakeholder status in the sense that they not should suffer or be killed to satisfy human medical or cosmetic needs, or to please our palate, as Singer expresses it. This is in practice identical with a semi-proper nature-environmental ethics based on sentience and consciousness as properties that qualify for moral stakeholder status. The weaker version of hedonistic nature-environmental ethics is when the focus is on the comfort and well-being of sentient animals as long as they are alive, and when painless slaughtering or killing is accepted.

In the following, the references to hedonistic nature-environmental ethics will be understood to represent the weak version that allows painless killing of nonhuman moral stakeholders.
The stronger version of the hedonistic nature-environmental ethics will then be covered by semi-proper nature-environmental ethics.

The hedonistic nature-environmental ethics as understood from now on might therefore be said to represent a weaker version of Singer’s ethical theory that allows painless killing. The semi-proper nature-environmental ethics, which does not allow killing normally, might then be said to be represented by the strong version of Singer’s ethical theory. Regan’s ethical theory, with the references to sentience, consciousness, and self-consciousness, represents as well the semi-proper nature-environmental ethical position. In addition, when Goodpaster and Taylor, in their considerations about practical ethics, in some way seem to accept that grading of direct moral status value is necessary, this might be interpreted as a weak version of their ethical theories which represent the proper nature-environmental ethical position.

**Summary of side comments so far – relevance of the conceptual model**

Two summaries of side comments related to the relevance of the conceptual model are given. One is about flourishing, while the other is about buzzwords.

**Flourishing – universal inner worth, particular inner worth and purely instrumental value**

Some of the notions given by the biocentric authors address issues related to the value characteristics used in the flourishing matrix and the inner worth table. In that sense they support the idea of splitting the values behind biodiversity into universal inner worth, particular inner worth and purely instrumental value. Regan addresses in this connection the blurred borderline between universal inner worth and particular inner worth, and the question of instrumental values linked to this. This is when he distinguishes between aesthetic, scientific, and sacramental kinds of interests in ecological entities, and the intrinsic values of pleasure and preference-satisfactions from inherent value. This sounds like he means that intrinsic values of this kind, just as particular inner worth, are strictly speaking instrumental.

Also Goodpaster addresses the blurred borderline between universal and particular inner worth. This is when he says that metaethics has always been a partially normative discipline. He refers to times and societies in which it might be argued that the moral standing of blacks, women, and children was deniable on conceptual grounds, which addresses that universal value-conferring properties might be particularly related to time, groups or individuals.
Taylor touches upon the very cognitive ground of the understanding of inner worth, especially universal inner worth, when he says that if the prime goal with environmental ethics is to secure biodiversity and nature as such as ends in themselves, then humans represent only one species among many, which for the benefit of the whole could just as well disappear. In relation to inner worth, Taylor says further that the moral attitude of respect for nature, which is the basis for his environmental ethics, is ultimate and not dependant on a set of feelings that comprise love for nature. It is therefore not about particularly affectionate feelings, but a universalisable attitude, he explains, which resembles the distinction made between particular inner worth and universal inner worth in the flourishing matrix and the inner worth table.

**Buzzwords – lack of arguments**
Related to value characteristics, it is noteworthy that Singer accuses philosophers of resorting to high-sounding phrases like intrinsic dignity, respect and worth when faced with situations where reasons appear to be lacking. This supports the relevance of addressing the use of buzzwords of the kinds mentioned in Chapter 1 (Introduction – research area). It also supports the intention of developing the conceptual model as a tool for analysing the values behind biodiversity, and by that, hopefully, reduce the use of buzzwords and contribute to an open and honest debate about environmental ethics.

**Summary of side comments so far – issues for the judgements of ethical records**
The first side comment is a general reflection about equity and substitutability, the next is about basic and non-basic needs, while the last concerns more practical statements about hunting and trapping.

**Ethical records – equity, substitutability**
When Taylor mentions distributive justice and restitutive justice among the priority principles for the fair resolution of conflict claims, this supports the Equity Principle as a framework for the judgements of ethical records in the case study. The principle of distributive justice is similar with the fair distribution part of the Equity Principle. This is when Taylor says that all parties should then be allotted an equal share of natural sources of good that can be used for the benefit of any of the parties. The principle of restitutive justice has similarities with the substitutability part. This is in the sense that it is about restoring the balance of justice by securing that some form of reparation or compensation is called for in relation to the harm done.
Ethical records – basic and non-basic needs
Taylor says that basic interests, such as subsistence and security, are essential to the very existence of persons, while non-basic interests vary from person to person. His saying that we can think of the good of a living thing as consisting of the full development of its biological powers combined with the above distinction between basic and non-basic interests, I interpret to support the relevance of distinguishing between basic and non-basic or luxury needs and preferences, such as it is decided for the judgements of ethical records in the case study.

Hunting and trapping – angling and game fishing
The most specific example of ethical issues related to the case study is Regan’s reference to hunting and trapping. He holds that the justifications for hunting and trapping for profit or sport are lame, given the rights view. He condemns sport hunting and trapping, commercial exploitation of wildlife, and domestication of animals in agriculture. Further in this connection, he does not accept the appeal to traditions, to keep the populations on a level that a habitat can support or to the philosophy of maximum sustainable yield. These are topics linked to the discussion of ethical records in the case study both in relation to the domestication of salmon, and in relation to the traditional angling and game fishing of wild salmon.

Summary of side comments so far – issues related to ecological literacy
Finally, summaries of side comments about ecological literacy, supra-individual ecological entities and the role of science are presented in the following.

Ecological literacy – environmental ethics
Both within the strong anthropocentric ethics and the biocentric ethics there are statements which, as far as I can see, relate to ecological literacy. These are both about the knowledge and the care parts of ecological literacy, and have therefore bearing on the Ecological Element as well as the Cultural Element of the Sustainability Context. In strong anthropocentric ethics this is referred to in relation to the need for being kind to animals, since that will develop good character in us. It is also related to the statement that the more we come in contact with animals and observe their behaviour, the more we love them. In the biocentric ethics, I interpret Regan’s idea of inherent value to represent a kind of attitude or world view that might be based on ecological literacy. In the practical interpretations of Goodpaster’s ethical
theory, I say that he adds to the indications that knowledge and care in some way are needed to create a sound basis for attaining satisfactory environmental ethical judgements and records. This is because Goodpaster emphasises that the regulative character of the moral consideration ascribable to all living things calls for sensitivity and awareness.

Further, in relation to the biocentric ethics, I particularly perceive Taylor’s approach to depend on ecological literacy. This is such as when Taylor says that the biocentric outlook on nature and the moral attitude of respect for nature should be consistent with all known scientific truths relevant to our knowledge. The same is his reference to scientifically informed and rational thinkers, and his statement that biological reality is an essential means to fulfil the aims set for adopting the attitude of respect for nature, and thus both rational and intelligible. In addition to these references related to the knowledge part of ecological literacy, I also note a reference related to the care part. This is when Taylor maintains that one of the dispositions that anyone who adopts the ultimate moral attitude would have is feelings towards what is favourable and unfavourable to ecological entities.

An interesting observation is that ecological literacy seems to get increased importance within the biocentric ethics when universal inner worth is expanded to an increasing range of ecological entities. This means that some kind of attitude based on ecological literacy more or less seems to be necessary for the practical applications of these ethical theories. Most pronounced in relation to this, so far, is Taylor.

**Supra-individual ecological entities – functional ecosystem health aspect**

It is particularly Regan and Taylor that despite the focus on individual ecological entities address the question of possible universal inner worth of supra-individual ecological entities. Regan holds strongly that individual rights are not to be outweighed by the care for the biotic community, something which he fears can lead to “environmental fascism” where the killing of humans might be allowed if that would be necessary to save endangered species. This might mean, I say, that Regan perceive supra-individual ecological entities primarily as support functions for individual entities. I therefore conclude that Regan’s position primarily seems to tend towards the anthropocentric functional ecosystem health aspect of sustainability with focus on particular ecosystem services. However, it cannot be ruled out that he also might support the anthropocentric structural ecosystem aspect and the focus on evolutionary
abilities, and even move towards the nonanthropocentric structural ecosystem aspect of sustainability.

More or less the same, I conclude, is the case with Taylor when he explains that the integrity and good of populations or communities consists in them maintaining themselves as coherent systems of related organisms whose average good is at an optimum level for the given environment. He says also that our duties to respect the integrity of natural ecosystems stem from the fact that this is a way in which we can help make it possible for wild species to maintain a healthy existence. Different from Regan is that Taylor explicitly extends universal inner worth to all living individual ecological entities, and thus more certainly would support the anthropocentric structural ecosystem aspect of sustainability and thus more likely also might accept the nonanthropocentric aspect.

Role of science – *create ecological literacy*

Side comments about the role of science are so far only given in relation to Taylor’s ethical theory. Here it is referred to Taylor’s statement that the biocentric outlook on nature should be consistent with all known scientific truths and be grounded on ‘the great lesson we have learned from the science of ecology’.

**5.4 Ecocentric ethics – *also supra-individual ecological entities are ends in themselves***

From the biocentric focus on individual ecological entities, the development of the conceptual model then continues within the more holistic views of the ecocentric ethics. This involves searching for value-conferring properties that might be used to ascribe some kind of direct moral status value to supra-individual ecological entities as well. References will be made to Aldo Leopold, J. Baird Callicott, Holmes Rolston III, Arne Næss and Laura Westra, who are all often referred to as supporters of ecocentric positions (Armstrong and Botzler 1993, Zimmerman et al. 1998, Pojman 2001).

Armstrong and Botzler (1993 p.369) state that there are two types of ecocentrism. One is the land ethic of Leopold and Callicott, and the other is the deep ecology of Næss. Zimmerman (1998 p.vi) also groups Næss under the deep ecology label, while he adds Rolston together
with Leopold and Callicott under the label of holistic approaches. Similarly Pojman (2001 p.75-76) refers to Næss as a representative of deep ecology, and to Leopold and Callicott as representatives of the holistic ecocentric approaches. Rolston, he says, is a contributor to the discussion of the possible intrinsic value of species and ecosystems. According to Callicott (1998a p.13), Rolston’s position actually represents a third type of ecocentrism, which is an augmentation of biocentrism. For the discussion of the ecocentric ethics in relation to the inner worth table I therefore have joined the land ethic represented by Leopold and Callicott, and Rolston’s augmentation of biocentrism together under a section term holistic approaches. This is followed by a section about the deep ecology theory of Næss. Lastly is a section where Westar’s concept of integrity is handled. Westra is included as a representative of ecocentrism because she, as mentioned in a footnote in Chapter 4 (Sustainability Context – contemporary perceptions), is the driving force behind a multidisciplinary group of researchers, called the integrity group, that take a holistic view on environmental issues.

5.4.1 Holistic approaches – land ethic and augmentation of biocentrism

Callicott (1998a p.13) states that holistic approaches attempt to attribute unconscious interests to environmental wholes, such as species and ecosystems. He says further that the holistic approaches to environmental ethics would require either a different theoretical paradigm or some theoretical means of cogently augmenting biocentrism. Callicott associates himself and Leopold with the different theoretical paradigm approach, while he, as mentioned, sees Rolston as a representative of authors that pursue the augmentation of biocentrism.

Leopold and Callicott – different theoretical paradigm

Callicott (1998a p.13) explains, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), that he and Leopold support a theoretical paradigm of holistic approaches to environmental ethics that is rooted in altruistic feelings like benevolence, sympathy and loyalty. This is contrary, Callicott maintains, to the standard paradigm of traditional ethics that is said to grant moral considerability to whatever different philosophers prefer as morally considerable, no matter how people may feel. Callicott explains that the altruistic feelings he refers to are those which Darwin suggested were naturally selected in many species. It is based on these altruistic feelings, Callicott (ibid. p.14) says further, that humans have reached the point where ‘the enlightened among us regard all human persons as members of one world community, […] subjected to a common ethics of humanity’. It is from
such a common ethics of humanity Leopold envisions that the next stage of human moral evolution is the land ethic. He sees the land ethic as a stage beyond the still incomplete ethic of universal humanity (Callicott 1998b p.106). This resembles the way Singer presents animal liberation as a movement built on and continuing the processes of women's liberation, black liberation and gay liberation. ‘The land ethic simply enlarges the boundaries of the community,’ Leopold (1987 p.204) says, ‘to include soils, waters plants, and animals, or collectively: the land’.

The essence of the land ethic is described by Leopold’s (ibid. p.224-225) frequently cited statement saying that ‘[a] thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community’, and that ‘[i]t is wrong when it tends otherwise’. Leopold (ibid. p.204) adds that the land ethic ‘changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it’, and further that ‘[i]t implies respect for his fellow-members and also respect for the community as such’. Callicott (1998a p.13-14) links, as also mentioned, the land ethic of Leopold to a universal ecological literacy that would ‘trigger sympathy and fellow-feeling for fellow members of the biotic community and feelings of loyalty and patriotic regard for the community as a whole’.

Callicott (1998b p.119) asks if the land ethic is prudential or duty-oriented ethics. This, he explains, is a question of whether the land ethic is a matter of enlightened human self-interest, or if it admits a true moral standing to nonhuman individual and supra-individual ecological entities. Callicott answers the question himself by saying that the conceptual foundations of the land ethic are duty-oriented rather than prudential. He builds this answer on Leopold’s (1987 p.223) belief that it is inconceivable that an ethical relation to land can exist without love, respect and admiration of land and a high regard for its value in the philosophical sense. Callicott (1998b p.120) interprets this to mean that land has a value similar to the intrinsic value or inherent worth often referred to by philosophers. Some, however, see this differently, by interpreting Leopold’s land ethic more as a prudential oriented ethics about human self-interests. One of them is Lehmann (1981 p.131), who says that Leopold’s argument is ‘homocentric, appealing to the human stake in preservation’. This claim has some merits, Callicott (1998b p.119) contends, since some of Leopold’s expressions might imply that the 5% economic species cannot survive if a significant portion of the uneconomic 95% is extirpated. Callicott’s (ibid. p.121) conclusion is that the land ethic is duty-oriented if seen from peoples’ real-life, inside point of view, and prudential from the objective and scientific
outside point of view. This is in the sense, he explains, that it from the inside involves genuine love, respect, admiration, obligation and self-sacrifice, with an ascription of intrinsic value, while it from the outside involves care for the land as a means of securing human survival.

**Rolston – cogently augmenting biocentrism**

Different from Callicott’s and Leopold’s holistic ecocentrism, Rolston pursues, as mentioned, some theoretical means of cogently augmenting biocentrism (Callicott 1998a p.13-14). He attempts a different synthesis of individualism and holism. This means, Callicott explains, that the core claim of biocentrism lies at the foundation of Rolston’s theory. This core claim, Callicott explains further, is that ‘any and every living thing is intrinsically valuable and thus morally considerable’. The augmentation of biocentrism is, as Callicott expresses it, about awarding ‘a value dividend’ to species and ecosystems on the basis of a biocentric valuation of living individuals. Callicott (ibid. p.15) explains this by saying that ‘in Rolston’s essentially biocentric system, [...] natural wholes, [...] possess an intrinsic value derived from the baseline intrinsic value of living organisms [...]’. Callicott says further that the natural wholes, such as species and ecosystems, ‘thus enjoy only derivative moral considerability’.

Rolston (1998 p.138) says that unlike higher animals, ecosystems have no experiences and they cannot care, and unlike trees, they have no organised centre. He (ibid. p.141) explains that ecosystems have values in themselves, but not for themselves. They are value producers, but not value owners. Rolston says further that the values of ecosystems neither are of the instrumental nor the intrinsic types, but as a systemic value. The ethical duty with regard to ecosystems arises, he (ibid. p.141) maintains, ‘in an encounter with the system that projects and protects these member components in biotic community’.

Recent development in ecology, which is the science that inspires and informs holistic environmental ethics, Callicott (1998a p15-16) says, may undermine some of the assumptions common to his own, Leopold’s and Rolston’s approaches. Most fundamentally, these concern doubts about the very existence of biotic communities and ecosystems, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions). If such ecological entities do not exist, then claims that they have intrinsic value would be otiose, Callicott says. Biotic communities are then no less real than human communities, and because of that human disturbances of nature per se should not be environmentally unethical. What is wrong, he asserts, is the scope and rate of most human environmental impacts. While forests, as an
example, may suddenly be destroyed by localised volcano eruptions, fires or hurricanes, human-caused deforestation is going on everywhere at once.

**Value-conferring properties – integrity, stability, beauty**

If it should be so that biotic communities and ecosystems in reality do not exist, then there would be no point in discussing any direct moral status value, universal inner worth or moral stakeholder status in relation to such supra-individual entities. This should mean that biotic communities and ecosystems would only have purely instrumental value or particular inner worth. Ethical assessments in relation to communities and ecosystems would then be about the values behind such supra-individual ecological entities as means to the flourishing of humans, and maybe also nonhuman individual organisms.

If, however, the references to biotic communities and ecosystems should after all have a real meaning, then it might be concluded, in relation to the inner worth table, that the duty-oriented dimension of the land ethic supports ascribing some kind of direct moral status value to supra-individual ecological entities. This means that entities such as the land and the biotic communities of soils, water plants and animals might have a universal inner worth.

The challenge then in relation to the inner worth table is to identify appropriate candidates that can be used as value-conferring properties for ascribing a direct moral status value to supra-individual ecological entities. Starting with the land ethic, I cannot see that there are any obvious candidates for this within the duty-oriented dimension. Possible candidates among characteristics mentioned are terms such as integrity, stability, and beauty. These might be seen as kind of structural properties similar to the biocentric value-conferring properties of being alive and the teleological centres of life. If integrity, stability and beauty should be used as value-conferring properties for ascribing direct moral status values to supra-individual ecological entities, the practical challenges would be equal with the biocentric positions of Goodpaster and Taylor. This is in the sense that either all or none of the ecological entities in question would qualify for moral stakeholder status. The difference is that Goodpaster and Taylor restrict themselves to individual ecological entities, while the land ethic focuses on supra-individual entities.

On the other hand, if the genuine love, respect, admiration, obligation and self-sacrifice related to the land is, as Lehmann says, of the homocentric kind, then there might be reasons
for arguing that the valuation of the land and the biotic communities of soils, water plants and animals in Leopold’s land ethic is of the prudential kind, related to personal preferences. The valuation of supra-individual ecological entities would then be more of the purely instrumental and the particular inner worth kinds. Ethical assessments in relation to supra-individual ecological entities would therefore, since supra-individual ecological entities would not be perceived to have a universal inner worth, be of the traditional inter-human ethical kinds only.

For Rolston’s ecocentric approach it is even more difficult, in the practical context of the inner worth table, to see how ecosystems might be ascribed a direct moral status value. This is because ecosystems, according to Rolston, get their systemic value on the basis of the instrumental and intrinsic value of their components. Therefore I do not see systemic value to be a reasonable ground for ascribing a direct moral status value that would give ecosystems a universal inner worth. When Rolston in addition emphasises how dependent individuals are on the ecosystem for their survival, the systemic value of ecosystems seems more to be related to the goods and services necessary to secure life support of individuals, and thus to be of the purely instrumental value category. At the very best, if considering how ecological entities might contribute to the full flourishing of humans, the systemic value of ecosystems might also be of the particular inner worth value category. Rolston’s ecocentric approach, when applied in the inner worth table, might therefore be limited to the biocentric core of his ethics. This means that the ethical assessments will basically depend on the direct moral status value that might be ascribed to individual ecological entities on the basis either of the biocentric ethical positions. It is therefore difficult to see that Rolston’s augmentation of biocentrism adds anything new to the inner worth table, other than perhaps an increased awareness about the importance of ecosystems as support systems to secure the goods and services necessary for the survival, growth and reproduction, and for that sake also the full flourishing, of individual ecological entities.

By this it seems that only the duty-oriented dimension of the land ethic, with value-conferring properties terms such as integrity, stability and beauty, might be used to ascribe direct moral status value to supra-individual ecological entities. The prudential dimension of Leopold’s land ethic and Rolston’s augmentation of biocentrism do not seem to add anything to the identification of value-conferring properties in the inner worth table.
With this, integrity, stability and beauty are, as shown in mind photo 5.7, added to being alive in the row of proposed value-conferring properties for ascribing direct moral status values to ecological entities.

### Mind photo 5.7  Inner worth table – added with holistic approaches

<table>
<thead>
<tr>
<th>Inner worth of ecological entities – holistic approaches</th>
<th>Ethical positions</th>
<th>Proposed value-conferring properties</th>
<th>Possible degrees of direct moral status value</th>
<th>Ecological entities with possible universal inner worth, cultural domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traditional inter-human ethics</td>
<td>Rationality</td>
<td>Equivalent with humans’</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Hedonistic or semi-proper nature-environmental ethics</td>
<td>Self-consciousness, consciousness, sentence</td>
<td>Less than humans’</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
</tr>
<tr>
<td></td>
<td>Proper nature-environmental ethics</td>
<td>Being alive or having integrity, stability and beauty</td>
<td>Distinctly less than humans’</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses or supra-individual ecological entities such as species and ecosystems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>or no universal inner worth, but particular inner worth, cultural domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational values</td>
</tr>
<tr>
<td>Aesthetic values</td>
</tr>
<tr>
<td>Scientific values</td>
</tr>
<tr>
<td>Evolutionary values</td>
</tr>
<tr>
<td>Symbolic values</td>
</tr>
<tr>
<td>Religious values</td>
</tr>
<tr>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses</td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value biological domain</td>
</tr>
<tr>
<td>Life support values</td>
</tr>
<tr>
<td>Cultural domain</td>
</tr>
<tr>
<td>Economic values</td>
</tr>
<tr>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>or no universal inner worth, but purely instrumental value cultural domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological domain</td>
</tr>
<tr>
<td>Life support values</td>
</tr>
<tr>
<td>Cultural domain</td>
</tr>
<tr>
<td>Economic values</td>
</tr>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

In the column to the right, termed proper nature-environmental ethics, it is now noted that in addition to individual ecological entities, also supra-individual ecological entities such as species and ecosystems might have a universal inner worth. It should be kept in mind that integrity, stability and beauty are proposed value-conferring properties specifically for supra-individual ecological entities, while being alive is specifically for individual ecological entities. The reading of this column should be so that the value-conferring property of being alive refers to mammals, birds, reptiles, amphibians, fishes, invertebrates, plants,
microorganisms like bacteria, viruses, while integrity, stability and beauty refer to the supra-individual ecological entities.

It should also be recalled that the value-conferring properties of integrity, stability and beauty, just as being alive, ascribe a direct moral status value either to all or to none of the ecological entities in question. This means that either all or none of the supra-individual ecological entities, such as species and ecosystems, might be ascribed a direct moral status value that qualifies for moral stakeholder status on the basis of the holistic approaches. Therefore all of them will either will be regarded as having universal inner worth as ends in themselves, or be regarded as having particular inner worth or purely instrumental value only.

The two other columns with the hedonistic or semi-proper nature-environmental ethics and the traditional inter-human ethics remain unchanged.

No indications are given by the holistic approaches of the possible grading of the direct moral status value of supra-individual ecological entities, such as it is described for the individual ecological entities. This means that only proper and not semi-proper nature-environmental ethics can be applied in relation to supra-individual ecological entities. As for being alive, I perceive integrity, stability and beauty to be value-conferring properties for ascribing a direct moral status value distinctly less than humans’.

Side comments to the holistic approached – issues related to ecological literacy

Two side comments are given. One is about ecological literacy, while the other is about the values behind ecosystems as a support function for individual ecological entities.

Ecological literacy – knowledge and care parts

The holistic approaches seem to address both the knowledge part and the care part of ecological literacy, and thus have bearing on the Ecological Element as well as the Cultural Element. The care part is specifically addressed by Callicott’s references to feelings, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), where I explain my inspiration for using of the “ecological literacy” term. When Callicott in connection with Leopold’s land ethic says that universal ecological literacy would trigger sympathy and fellow feeling for other members of the biotic community, as well as feelings of loyalty and patriotic regard for the community as a whole, this has similarities with Kant’s belief that contact with
animals will make us love them. Rolston on the other hand seems to be closer to Taylor’s scientifically related ecological literacy, and thus to focus more on the knowledge part of ecological literacy. Central to Rolston’s ecocentric approach is the importance of being aware of and taking into consideration the interconnection between individual organisms and ecosystems. Part of this is the need for awareness about the importance of ecosystems as support systems to secure the services and goods necessary for the survival, growth and reproduction of individual ecological entities, and for that sake also their full flourishing. This is what he refers to as the systemic value of ecosystems, which links with the next side comment about supra-individual ecological entities.

**Supra-individual ecological entities – support to individual ecological entities**
At the outset it is natural to believe that the holistic approaches should represent value perceptions that build on the nonanthropocentric structural ecosystem aspect of sustainability. I see that this might be the case for the duty-oriented interpretation of Leopold’s land ethic. Rolston’s notion of systemic value, however, might together with the interpretation of Leopold’s land ethic as prudential be understood to be about the values behind ecosystems as support functions for individual ecological entities. In that case they rather represent the anthropocentric functional and structural ecosystem aspects of sustainability. This has some similarities with Regan and Taylor’s views on supra-individual ecological entities. Taylor addresses this in particular with his statement that our duties to respect the integrity of natural ecosystems stem from the fact that this is a way in which we can help make it possible for wild species to maintain a healthy existence. Quite similarly, Rolston contends that ecosystems have values in themselves in the sense that they protect the member components. Leopold might be interpreted the same way, in that the motivation to care for the land’s 95 % uneconomic species is that they are necessary for the survival of the 5 % economic.

### 5.4.2 Deep ecology – Næss

Deep ecology, as described by Næss (1998 p.205), consists of four levels, where the first level represents the deepest normative positions which comprise the ultimate and fundamental premises of our thinking. Different philosophical theories and positions, and the major world religions, represent examples of kinds of fundamental premises. The next level is a set of norms created by a deductive process on the basis of the fundamental premises to agree on. Næss’ idea is that it should be possible on this level to achieve consensus regarding some case
specific norms, regardless of position in level one. Based on these norms, then, normative
decisions about more practical goals and political strategies can be made on level number
three. At this third level discrepancies can appear again with regard to the political strategies.
These discrepancies can be across the deeper normative position of level one. The fourth level
regards practical actions, where even more disagreement may appear.

As part of the second level Næss has formulated eight points as a platform for deep ecology.
The first of the eight points is formulated as follows:

The well-being and flourishing of human and nonhuman Life on Earth have value in
themselves (synonyms: intrinsic value, inherent value). These values are independent
of the usefulness of the nonhuman world for human purposes. (Næss 1986 p.14)

According to Wetlesen (1996 p.61-62), this implies that things in addition to having values in
themselves may have instrumental values which are dependent on their usefulness for human
purposes. He says further that the formulation of this point is somewhat unfortunate since it
ascribes value in itself only to the well-being and flourishing of human and nonhuman Life on
Earth, and not to these beings in their own right. This might therefore be understood to mean,
Wetlesen explains, that things are valued on account of their achievements or what they have,
rather on what they are. To avoid any misunderstandings about this, Wetlesen suggests the
following reformulation of the first point:

Human and nonhuman Life on Earth have value in themselves (inherent value), and
their states of well-being and flourishing also have value in themselves (intrinsic
value). These values are independent of the instrumental value of the nonhuman world
for human purpose. (Wetlesen 1996 p.64)

The second of the eight points state that richness and diversity of life forms contribute to the
realisation of the values mentioned in point one, and are also values in themselves. Næss
(1986 p.15) emphasises in relation to the second point that so-called simple, lower or
primitive species of plants and animals, which contribute essentially to the richness and
diversity of life, also have value in themselves. They are thus not seen merely as steps towards
higher order or rational life forms. Added to the second point is the third saying that humans
have no right to reduce the richness and diversity except to satisfy vital needs. The term vital
needs is deliberately left vague, Næss says, because differences in societies need to be taken
into consideration. The fourth point states that both the flourishing of human life and culture
and of nonhuman life requires a smaller human population. The fifth point says that human interference with the nonhuman world is rapidly worsening. The last three points handle policies and actions necessary in relation to the first five points.

As a practical suggestion for the implementation of deep ecology, Næss has suggested what he sees as an acceptable ration for ecological planetary health. This is referred to by Sessions both in a text book (1998. p177) and in an interview (1994 p.4), and lately also in an interview with Næss (2005 p.30). Næss’ suggestion is that an acceptable ratio would consists of one-third to be preserved as wilderness, one-third as free nature with mixed communities of humans, wild animals and plans, and one-third for cities, paved roads and the like.

Value-conferring properties – *Life on Earth*

Though the first point of the deep ecology platform states that human and nonhuman Life on Earth have value in themselves, there seems to be some uncertainty with regard to how this should actually be interpreted. In relation to the inner worth table, it is difficult to say if the deep ecology would imply that nonhuman Life on Earth represents a universal inner worth. Wetlesen’s comment is interesting in the sense that it indicates a split in the ways the value of humans and nonhumans are understood by the deep ecology. One is as values in themselves, termed inherent value, which in the context of the inner worth table should mean a universal inner worth kind of value. The other is the state of well-being and flourishing, termed intrinsic value, which in the context of the inner worth table tend more towards values behind biodiversity of the particular inner worth or purely instrumental value categories.

If deep ecology should imply that nonhuman Life on Earth should have a universal inner worth, it gives no indication about what might be possible value-conferring properties. It could be said, however, that Life on Earth is a structural value-conferring property, similar to Goodpaster’s being alive and Taylor’s teleological centre of life. The notion in the second point of the platform, saying that richness and diversity of life forms contribute to the realisation of these values, may furthermore give associations to the structural integrity, stability and beauty properties in the land ethic. But if Life on Earth should be used as a structural value-conferring property on the basis of deep ecology, again as for those suggested for the land ethic and the holistic approaches of Goodpaster and Taylor, direct moral status value would be ascribed either to all or to none of the ecological entities in question. As mentioned for the land ethic, also here the difference is that Goodpaster and Taylor restrict
themselves to individual ecological entities, while deep ecology includes supra-individual entities.

Since supra-individual ecological entities are already added as entities with a possible universal inner worth, due to the holistic approaches, it is difficult to see that deep ecology adds anything new to the inner worth table. What it does, however, is to strengthen the emphasis on life itself as a proposed value-conferring property for ascribing a direct moral status value to ecological entities, both individual and supra-individual. In order to mark this, the inner worth table will include the Life on Earth notion in the proper nature-environmental ethics column, and else leave the table unchanged, as shown in mind photo 5.8.

**Mind photo 5.8  Inner worth table – added with deep ecology**

<table>
<thead>
<tr>
<th>Inner worth of ecological entities – deep ecology (Holistic approaches, biocentric ethics and strong anthropocentric ethics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical positions</td>
</tr>
<tr>
<td><strong>Proposed value-conferring properties</strong></td>
</tr>
<tr>
<td>Possible degrees of direct moral status value</td>
</tr>
<tr>
<td>Ecological entities with possible universal inner worth, Life domain</td>
</tr>
<tr>
<td>Direct moral status value that might qualify for moral stakeholder status</td>
</tr>
<tr>
<td>or no universal inner worth, but particular inner worth, Cultural domain</td>
</tr>
<tr>
<td>Recreational values</td>
</tr>
<tr>
<td>Aesthetic values</td>
</tr>
<tr>
<td>Scientific values</td>
</tr>
<tr>
<td>Evolutionary values</td>
</tr>
<tr>
<td>Symbolic values</td>
</tr>
<tr>
<td>Religious values</td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value, Biological domain</td>
</tr>
<tr>
<td>Life support values</td>
</tr>
<tr>
<td>Cultural domain</td>
</tr>
<tr>
<td>Economic values</td>
</tr>
</tbody>
</table>

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Side comments to deep ecology – relevance of the conceptual model

One side comment related to the relevance of the conceptual model is given.

Intention of the conceptual model – values behind biodiversity

In relation to the four levels of deep ecology, the intention of the conceptual model can be understood to be a help in moving from the first to the second level. This is in the sense that there might be a wide range of normative positions with regard to the inner worth of ecological entities. Clarifying this will hopefully make it easier to find solutions and agreements at the case specific second level. This means to move towards a mutual understanding and ideally a consensus regarding which ecological entities might have a universal inner worth. A part of this is also how the particular inner worth and purely instrumental valuations of ecological entities might be handled.

Side comments to deep ecology – issues for the judgements of ethical records

In relation to the judgements of ethical records, one side comment is given in regard to basic versus non-basic needs.

Flourishing – basic and non-basic needs

The emphasis on vital needs indicates that deep ecology does not support a reduction of richness and diversity of life forms due to humans’ non-basic and luxury needs and preferences. Similar to Taylor’s references to basic and non-basic interests, this seems to support the relevance, in relation to flourishing, of differentiating between basic life support needs and the more non-basic and luxury needs of the cultural domain. Naess’ comment that the term “vital needs” is deliberately left vague addresses the problem of defining basic needs. This was also addressed in Chapter 4 (Sustainability Context – contemporary perceptions), especially in relation to the different perceptions in different societies of what is absolutely necessary of both biological and cultural needs.

Side comments to deep ecology – issues related to ecological literacy

One side comment will be given to supra-individual ecological entities.
Supra-individual ecological entities – *functional and structural ecosystem aspects of sustainability*?

I believe the statement in the deep ecology platform that nonhumans Life on Earth have value in themselves implies that supra-individual ecological entities have a universal inner worth. This points therefore towards a value perception which builds on the nonanthropocentric structural ecosystem aspect of sustainability. On the other hand, even the deep ecology might be interpreted to represent a value perception that in some way might be said primarily to build on the anthropocentric functional and structural ecosystem aspects of sustainability. What I think of here is such as the practical suggestion for the implementation of deep ecology saying that an acceptable ration for ecological planetary health is to have one-third each of preserved as wilderness, free nature with mixed communities of humans, wild animals and plans, and cities, paved roads and the like.

5.4.3 Ecological integrity approach – *evolutionary capacity, ecosystem health*

It should be recalled from Chapter 4 (Sustainability Context – *contemporary perceptions*) that Westra (1994 p.5-6) proposes an environmental ethics based on the principle of integrity. Though she emphasises that the principle of integrity is not an attempt to formulate yet another environmental ethic, she might agree that she contributes to a different environmental ethical paradigm in the sense addressed by Callicott.

**Principle of integrity – theoretical basis**

It is worth repeating from Chapter 4 (Sustainability Context – *contemporary perceptions*) that Westra (1994 p.24-25) in her provisional definition of integrity says that ecosystem integrity is an ‘umbrella’ concept of which ecosystem health is a subelement. She (ibid. p.27) distinguishes ecosystem health from ecosystem integrity, by such as cultural relativity, limited time frame, emphasis on functional attributes, social constructs and support functions. Ecosystem integrity, on the other hand, is a real and objective condition, she says, and not one which is defined by cultural agreements such as the case is for ecosystem health. Westra (ibid. p.22) describes the wholeness of integrity to represent both a natural and a cultural part, which are not always clearly separated.
It should also be recalled that Westra in essence holds that the number of values that can be attributed to integrity are at the outset nonanthropocentric, although most of these values have further anthropocentric applications. It is nonanthropocentric in the sense that ecosystem integrity represents an objective condition or value which reaches beyond the more culturally relative and anthropocentric ecosystem health. Finally in this recapitulation of how Westra describes the principle of integrity it should be mentioned that she sees the paradigm case of integrity to lie in wild, largely undisturbed ecosystems, while most of what we can produce or use is within the realm of ecosystem health. Her aim therefore is to show the absolute value of ecosystem integrity both as a benchmark and as a necessary support for ecosystem health (ibid. p.27, 69-70).

**Principle of integrity – practical approach**

After this recapitulation of the main elements of the theoretical basis of Westra’s environmental ethics, some word will be said about her practical approach. This is to prepare for the discussion of how Westra’s ethics might be understood in the practical context of the inner worth table.

**Integrity – environmental descriptive and moral prescriptive**

Westra (1994 p.21-22) uses the term integrity both in an environmental descriptive and a moral prescriptive sense. The descriptive use of integrity includes the wholeness of a living system, both a natural and a cultural part, which, as mentioned, are not always clearly separated. She refers in this connection to Regier et al. (1990 p.18), who says that terms like health, wholeness and integrity have been applied to a broad range of phenomena, where the underlying paradigm usually is that of a living system, either in a natural biotic sense or in a cultural sense, or both. Westra (1994 p.21-22) understands culture to mean the specific activities of the human members of the biota, and thus as a partially natural activity. The moral perspective, she (ibid. p.65-67) says, is that integrity suggests a universal value, comparable to peace and health, knowing no national or geographical borders. But unlike peace and health that could be fostered between and within a few nations, integrity is an environmental goal that requires global application. Integrity is also about freedom, including freedom from harm, and the capacity to develop and change while retaining identity.

Westra summarises the moral implications of the principle of integrity by the following description (1) and two categorical imperatives (1a and 1b):
1. The first moral principle is that nothing can be moral that is in conflict with the physical realities of our existence or cannot be seen to fit within the natural laws of our environment in order to support the primacy of integrity.

[...] 

1a. Act so that your action will fit (first and minimally) within universal natural laws.

and

1b. Act so that you manifest respect for and understanding acceptance of all natural processes and laws (although self-defence is acceptable). (Westra 1998 p.24)

Second-order principles – *bridge to principle of integrity*

As a part of the practical approach it should be recalled that Westra (1998 p.24-28, 46) has described eight second-order principles in an effort to provide a bridge from the principle of integrity to actual conflicts and problems demanding resolution. The first three second-order principles focus on the need for awareness about the complexities and uncertainties related to environmental and sustainability issues. They provide suggestions that are methodological and cognitive, stating that policies should be designed to embrace complexity, judgements should be based on the post-normal science approach and activities should be limited by the precautionary principle. The fourth and fifth second-order principles address sustainability more pragmatically, by focussing on the world’s ecological carrying capacity. They state that we must reduce our ecological footprint and that it is imperative to eliminate many of our present practices, including rejecting technical maximality. The final three second-order principles are about living in integrity. Principle six states that the essential meaning of the ethics of integrity is that it is necessary for humanity to learn to live as in a buffer and to respect and protect core wild areas. It states further that we must view all activities as taking place in a buffer zone. When we conduct ourselves, and design and accept public policy as though we were living in a buffer zone, and when we recognise the primacy of respecting core or wild areas for their intrinsic as well as their instrumental value, we have, according to Westra (ibid. p.214), accepted the basic tenet of the principle of integrity. With regard to the possible value of ecological entities as ends in themselves, the seventh and eighth second-order principles seem to indicate that no supra-individual ecological entities should have values that override the value of individuals. Further regarding individual nonhuman organisms, Westra (ibid. p.255-256) argues that if our personal or species survival are at stake we may take measures based on self-defence and self-preservation rather than the ethics of
integrity. ‘This means not only killing a carrot or a fish or – if it were the only nourishment available – even a bird or mammal to survive is permissible from the moral point of view but also that killing viruses or bacteria is permissible on the same grounds’, she says.

**Principle of integrity – practical ethical consequences**

An effort will now be made to see how Westra’s environmental ethics based on the principle of integrity might be understood in the practical context of the inner worth table. Westra is aware of the challenges of applying the principle of integrity in connection with practical approaches. She (1994 p.183) says, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), that despite her suggested second-order principles, there are no such principles that evidently follow from the principle of integrity. Therefore, there is no assurance that only one choice of action or policy would ensure or fit its requirements. A consequence of this, she contends further, is that ‘a lot of deep thinking’ and analysis is left to the moral agent, because no ‘user’s rules’ come with the principle of integrity, and the extent of our obligation or scale of integrity required is not specified. The reference to ‘a lot of deep thinking’ gives some associations to Regan’s statement that he leaves it to others to work out environmental ethics on the basis of his proposed alternatives. This will be handled further in the side comments to Westra’s environmental ethics.

Despite these difficulties, Westra (ibid. p.215) says that the principle of integrity must be rendered operational and shown to be functionally better than other holistic positions in order to be viable. She clarifies at the same time that the precision cannot be incompatible with its nature as a principle and with the imprecision of the science that supports it. On this basis she (ibid. p.215-216) has suggested three steps for how to render the principle of integrity operational within the parameters of today’s knowledge. The first step is to designate global and regional areas that should contain different forms of integrity, both full integrity areas and healthy buffer areas. The second step entails a consideration of the possible reach of the principle of integrity in relation to inter-human ethics and social goals. The third step is a dialog with moral doctrine beyond our species.

**First step – buffer areas**

The first step, which is about appropriately sized full integrity and healthy buffer areas, links to Westra’s sixth second-order principle. Here she (1998 p.28) states, as mentioned, that the essential meaning of the ethics of integrity is that we must view all activities as taking place
within a buffer zone. This recognition is established on the basis of the first five second-order principles, which in short can be said to address the need to focus on the world’s ecological carrying capacity, to be aware of the complexities and uncertainties linked to environmental issues, and to apply the precautionary principle. As mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), Westra (1994 p.183) argues that there is a necessity for areas where the primary sense of integrity must prevail. This, she argues further, demands setting up boundaries for buffer zones where a less demanding sense of integrity limited to healthy ecosystems is necessary.

Also mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), when Westra (1998 p.138) states that all human culture, activities and institutions should conform to the requirements of a buffer zone in relation to core or wild areas, she indicates how large these areas should be. She says that if 20 to 45 % of the earth’s surface should be protect as wild areas of ecological integrity, then it is our obligation to dwell in the remaining 55 to 80 % in ways that produce no adverse impact upon the wild areas. This is similar to Naess’ suggested three zones of one-third preserved wilderness, one-third free nature with mixed communities of humans, wild animals and plans, and one-third with cities and paved roads.

In general, however, the scale of urban spread or cultural centres that might be acceptable within or linked to buffer zones is unclear, Westra (ibid. p.216) says. She (1998 p.138) describes urban areas to be areas where little evolutionary processes persist. She (1994 p.185) emphasises that urban areas or cultural centres must harmonise with integrity both in the primary ecological and secondary health sense. In connection with this, Westra (ibid. p.218) contends that the relevant question is how much urban culture are the minimum we can live with and the maximum the Earth can tolerate. In Chapter 4 (Sustainability Context – contemporary perceptions) I gave two possible interpretations to this question. One is that the minimum urban culture humans can live with refers to basic life support needs for survival, growth and reproduction. The other interpretation is that the minimum urban culture humans can live with might refer to needs for the fulfilment of humans’ biological and cultural flourishing potentials. Linked to this it can be asked whether Naess’ and Westra’s proposed kinds of zoning are pragmatic suggestions towards a state of absolutely minimal cultural activities for the benefit and extension of wild nature areas. On the other hand, it can also be asked whether the zoning is motivated by an acceptance of humans’ wishes to fulfil their
biological and cultural flourishing potentials and on this basis find out how such fulfilments can be balanced with what the Earth can tolerate.

If the answer is yes to the first question, then it seems that the prime objective is a structural ecosystem aspect of sustainability. The aim is then to keep areas wild as much as possible at the expense of human cultural activities. As a consequence of this, the urban zones should be reduced to what is absolutely necessary to secure humans’ basic life support needs for survival, growth and reproduction. This represents a care and respect for nature as a whole that ultimately might tend towards a perception that nature has a universal inner worth. If, however, the answer is yes to the second question, then the focus is on functional ecosystem health aspect of sustainability as a basis for securing human biological and cultural flourishing. In this case the focus is more on the fulfilment of humans’ cultural needs and preferences at the expense of wild areas, but still balanced against the maximum the Earth can tolerate.

Second step – inter-human ethics
Continuing with the second step, which is a consideration of the possible reach of the principle of integrity in relation to inter-human ethics and social goals, it should be recalled again that Westra (1994 p.5-6) does not see the principle of integrity as an attempt to formulate yet another environmental ethic. It is in connection with this that she (ibid. p.186, 191) maintains, as mentioned in Chapter 3 (Method – a post-normal science approach), that the principle of integrity does not specifically describe interpersonal relations, and that for instance the Harm Principle and the Equity Principle are important supplements when dealing with policy options.

The principle of integrity thus cannot tell which social system is preferable, but it can show, Westra (ibid. p.186) says, ‘where and why international relations might be contravening its tenets’. As mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), she says this based on a statement that social and political action in an international global context is the one context within which the principle of integrity can be legitimately translated. More practically oriented Westra (ibid. p.205) contends that the principle of integrity only issues a categorical imperative when life-sustaining systems are in peril, and that it does not arrogate to itself the right to dictate in other cases. Westra (ibid. p.185) holds that an acceptable scale of urban spread should take into consideration that humans need sustainable and equally
distributed food production, supporting both present and future generations. In addition
shelter and energy also fall under this heading, she says. In summary it might be said that the
social goals in the second step at least should be to secure life supporting systems and that
taking risks that might threaten these systems would be ethically wrong.

Parallel to the above, Westra (ibid. p.202) emphasises, as referred to in Chapter 4
(Sustainability Context – contemporary perceptions), that universal survival ought to come
before individual preferences. A holistic approach is therefore required, she (ibid. p.200)
asserts, concerning the coexistence of entities on the planet as individuals who are totally
dependent on the same life support systems. So, despite still respecting individual cultural
differences, viewpoints and groupings as embodied in separate nation-states, she (ibid. p.204)
says that the principle of integrity requires a universal stance that accepts global survival as
primary. However, she (ibid. p.202) contends further, there is nothing to prevent an individual
in a less developed country from desperately wanting to enjoy not only freedom from famine
and deprivation, but also parity with the lifestyle of more developed countries, with all their
wasteful and unsafe practices.

In summary, the first and second steps of rendering the principle of integrity operational seem
largely to be about inter-human ethics that focus on securing the necessary life support
systems and social equity. The first step also addresses the question of whether it is human
flourishing or wild nature that is the main concern in relation to the principle of integrity. This
will be discussed further in the following, which is about moral doctrine beyond our species.

Third step – moral doctrine beyond our species
In the context of the inner worth table the third step addresses the question of universal inner
worth and possible value-conferring properties that would qualify ecological entities for a
moral stakeholder status. In a discussion of some consequences of adopting the principle of
integrity, Westra (1994 p.183) says that the ethics involved is an ‘all-encompassing
environmental morality, one relating to all species’. This means respect for the basis of life as
well as for all entities living within ecosystems, including animals, she (ibid. p.202) explains.

Statements referred to when Westra argues for why humans have moral obligations in relation
to ecosystems, are such as structural integrity, wholeness of living systems, a real and
objective condition, universal value, common denominator of value globally, and that nothing
can be moral that cannot fit within the natural laws. Some of these expressions, specifically structural integrity and wholeness of living systems, might have some similarities with the structural kinds of value-conferring properties, such as the holistic and deep ecology terms integrity, stability, beauty and Life on Earth, and the more structural biocentric terms being alive and teleological centres of life.

In the sixth second-order principle where Westra addresses the need for buffer zones, it should be recalled that she also says that we should recognise the primacy of respecting core or wild areas for their intrinsic as well as their instrumental value (Westra 1998 p.214). However, though intrinsic value is mentioned, nothing is said that can be used to qualify whether this intrinsic value should be understood as a kind of universal inner worth. No descriptions are given that in the context of the inner worth table might work as value-conferring properties to ascribe direct moral status values to supra-individual ecological entities.

When exploring the relation between individuals and wholes in the seventh second-order principle, Westra (ibid. p.236) maintains that we must respect the individual integrity of single organisms for their individual functions and for their contribution to the systematic whole. The notion that integrity of single organisms should be respected for their individual functions might indicate that the intrinsic value referred to is of the universal inner worth kind. The other notion, however, that the integrity of single organisms should be respected for their contribution to the systemic whole tends more towards an instrumental value as means to secure the wholeness of ecosystems.

When Westra specifically discuses the individual ecological entity aspects of integrity, she (1994 p.35) states that the paradigm case is that of a living organism in a natural biotic sense. She (ibid. p.37) also says that at this individual level, as on the ecosystem level, the applicable concept of integrity that emerges is both structural and functional. It is especially the structural integrity of individuals that appears to embody a strong value and to represent the basis for moral considerability, she says further. She seems to put more emphasis on the structural integrity, which is about the ‘unitary whole’ of an organism, than on the functional integrity, which is restricted to such as its single anatomic parts and other capacities to function (ibid. p.36-37). As for the supra-individual perspective, Westra might be interpreted to mean that the direct moral status value of individual organisms is not linked to functional properties such as sentience, consciousness or rationality, but that it is more about being alive.
and the teleological centres of life. But whatever might be the basis for the value of individual ecological entities, Westra accepts, as mentioned, that humans may kill viruses and bacteria in self-defence, and that even animals might be killed for nourishment purposes. This might indicate that she in practical situations allows or sees the need of some grading of direct moral status value in relation to humans.

**Strong or weak version – wild nature or human culture**

On the basis of the above comments, a strong and a weak version of Westra’s environmental ethics will be described. The difference between the two versions is linked to the question of whether ecological entities have universal inner worth or not. In the strong version all kinds of ecological entities are granted a moral stakeholder status and a universal inner worth, while they in the weaker version are only valued either purely instrumentally or as entities with a particular inner worth.

**Strong version – wild nature at the expense of human culture**

The strong version represents the situation in the first step where the answer is yes to the first question about Næss’ and Westra’s proposed kinds of zoning. This is whether the zoning is a pragmatic suggestion towards a state of absolutely minimal cultural activities for the benefit and extension of wild nature areas. This is the position where wild nature is the main concern at the expense of human cultural activities. The focus is then on the structural ecosystem aspect of sustainability and potentially a nonanthropocentric position as a basis for granting a moral stakeholder status and a universal inner worth to all kinds of individual and supra-individual ecological entities. It should be recalled from Chapter 4 (Sustainability Context – contemporary perceptions) that the structural ecosystem aspect of sustainability concerns the likes of unity, completeness and value, and focuses on the optimum undiminished capacity for sustained evolutionary development. It should also be recalled that anthropocentric functional ecosystem health aspect of sustainability, is a subelement of the structural ecosystem aspect. The functional ecosystem health aspect of sustainability is then in the strong version of Westra’s environmental ethics understood to be about securing the viability of all ecological entities. To achieve this, the priority should be on basic life support needs to secure survival, growth and reproduction of the ecological entities, which should mean focus on the particular ecosystem services. It is, however, difficult to say how this would influence humans’ cultural needs and preferences and the possibilities of supporting human flourishing potentials. If the focus tends towards the evolutionary abilities and the nonanthropocentric structural ecosystem
aspect of sustainability, there probably would be little room for urban spread. This is especially so if all kinds of plants and animals, together with the great variety of ecosystems, should have a direct moral status value that qualifies for moral stakeholder status and a universal inner worth.

The strong version of Westra’s environmental ethics therefore represents, as described in Chapter 4 (Sustainability Context – contemporary perceptions), a value perception where the nonanthropocentric structural ecosystem aspect of sustainability gain priority on the expense of the more anthropocentric focus on the functional ecosystem health aspect.

Possible candidates for value-conferring properties within this strong version might, as mentioned in the third step, be structural integrity and wholeness of living systems. These two expressions have similarities with the structural kinds of value-conferring properties, mentioned in relation to the biocentric positions of Goodpaster and Taylor, the holistic approaches and deep ecology. This means that they apply without any kind of differentiation or grading among ecological entities. Within the context of the inner worth table this means in principle that either all kinds of individual and supra-individual ecological entities equally qualify for moral stakeholder status, or that none qualify.

**Weak version – main concern is human culture**

The weak version of Westra’s environmental ethics represents the situation in the first step where the answer is yes to the second question about Næss’ and Westra’s proposed kinds of zoning. This is whether the zoning is motivated by an acceptance of humans’ wishes to fulfil their biological and cultural flourishing potentials and on this basis find out how such fulfilments can be balanced with what the Earth can tolerate. The focus is then on the anthropocentric functional ecosystem health aspect of sustainability. Support to this weak version is when Westra, as referred to in Chapter 4 (Sustainability Context – contemporary perceptions), says that ecosystem health and functional integrity are anthropocentric and culturally relative, with focus on social constructs and sustainable biophysical production in support of human interests. This might mean that ecosystem health and functional integrity, in addition to securing the life support of humans, is partially intended to secure some cultural dimensions of human flourishing. When Westra, as also mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), refers to Rolston’s (1988 p.163) statement that humans want to value the lush life that ecosystems maintain, she indicates that
aesthetic and recreational values are parts of the principle of integrity. This enforces the importance of the cultural dimension as a motivational factor for caring about ecosystem health and functional integrity.

If human interests are the prime objective, then, the above might be interpreted to mean that ecological entities are only valued purely instrumentally or as entities with a particular inner worth. They are then not granted a direct moral status value and a universal inner worth. In the context of the inner worth table, the weak version seems to represent a traditional inter-human ethical position.

The purpose of the structural ecosystem aspect of sustainability might therefore in this context primarily be as a basis for securing the ecosystem goods and services for human flourishing. This means securing the systemic whole as the ecological basis for the fulfilment of humans’ biological and cultural flourishing potentials. To achieve this it will be necessary to take into account the ecosystem complexity and uncertainty, the precautionary principle and the world’s ecological carrying capacity. This therefore boils down to a question about the carrying capacity of the Earth and what risks the societies are willing to take in relation to the size of urban zones and the fulfilment of humans’ flourishing potentials. In a colloquial and caricatured way, it might be said that this is a question of to what extent people prefer coffee bars and roads before wild nature, and how many coffee bars and roads the Earth can tolerate.

Related again to the value perceptions from Westra’s philosophical approach mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), the weak version of Westra’s environmental ethics represents the situation where the functional ecosystem health aspect of sustainability gain priority over the structural ecosystem aspect.

**Value-conferring properties – integrity**

By this, the weak version of Westra’s environmental ethics, as long as it is understood to represent a traditional inter-human ethical position, adds nothing new to the inner worth table with regard to value-conferring properties. Unless some hedonistic nature-environmental ethical positions should be linked with the weak version, ecological entities are only valued purely instrumentally or as entities with a particular inner worth.
The strong version, however, might, by the wholeness term and by the adjective “structural” added to the integrity term, be perceived to usefully supplement the row with proposed value-conferring properties in the column containing proper nature-environmental ethical positions. I have therefore added this to the inner worth table, as shown in mind photo 5.9. I do not think, however, that this in essence changes much in relation to what is already noted on the basis of the biocentric and holistic ethical positions.

**Mind photo 5.9** Inner worth table – *added with Westra’s ethics*

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Proposed value-conferring properties</th>
<th>Inner worth of ecological entities – <em>Westra’s ethics</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><em>Strong anthropocentric ethics, biocentric ethics and ecocentric ethics including Westra’s environmental ethics</em></td>
</tr>
</tbody>
</table>
| Traditional       | Rationality                          | **| **
| inter-human        | Self-consciousness, consciousness,   | **| **
| ethics             | sentience                            | **| **
|                   |                                       | **| **
| Hedonistic or      |                                       | **| **
| semi-proper        |                                       | **| **
| nature-environment |                                       | **| **
| ethics             |                                       | **| **
|                   |                                       | **| **
| Proper nature-     |                                       | **| **
| environmental      |                                       | **| **
| ethics             |                                       | **| **
|                   |                                       | **| **
|                   | Equivalent with humans’              | **| **
|                   | Less than humans’                    | **| **
|                   | Distinctly less than humans’         | **| **
| Possible degrees of direct moral status value | None | Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?) | Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses or supra-individual ecological entities such as species and ecosystems |
|                   |                                       | Fishes(?), invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems | None |
| Ethical positions | Proposed value-conferring properties | Inner worth of ecological entities – *Westra’s ethics* |
|                   |                                       | *Strong anthropocentric ethics, biocentric ethics and ecocentric ethics including Westra’s environmental ethics* |
|                   |                                       | **| **
| Traditional       | Rationality                          | **| **
| inter-human        | Self-consciousness, consciousness,   | **| **
| ethics             | sentience                            | **| **
|                   |                                       | **| **
| Hedonistic or      |                                       | **| **
| semi-proper        |                                       | **| **
| nature-environment |                                       | **| **
| ethics             |                                       | **| **
|                   | Equivalent with                        | **| **
|                   | Less than humans’                    | **| **
|                   | Distinctly less than humans’         | **| **
| Ethical positions | Proposed value-conferring properties | Inner worth of ecological entities – *Westra’s ethics* |
|                   |                                       | *Strong anthropocentric ethics, biocentric ethics and ecocentric ethics including Westra’s environmental ethics* |
| Traditional       | Rationality                          | **| **
| inter-human        | Self-consciousness, consciousness,   | **| **
| ethics             | sentience                            | **| **
|                   | Equivalent with                        | **| **
|                   | Less than humans’                    | **| **
|                   | Distinctly less than humans’         | **| **

Apart from adding structural and wholeness to the column containing proper nature-environmental ethical positions, nothing else is changed in the inner worth table.
Side comments to Westra – relevance of the conceptual model

One side comment related to the relevance of the conceptual model is about grading of direct moral status value.

Direct moral status value – grading

Westra (1998 p.255-256) argues, as mentioned, that only if our personal or our species survival is at stake may we take measures based on self-defence and self-preservation rather than the ethics of integrity. She adds that it is permissible for the purposes of survival to kill a carrot or a fish or even a bird or mammal, if they were the only nourishment available, and that killing viruses or bacteria is also permissible on the same grounds. This might indicate that also Westra in practical situations might allow or see the need of some grading of direct moral status value in relation to individual ecological entities.

No indications of possible grading of direct moral status value are, however, given in relation to supra-individual ecological entities. They are either ascribed a direct moral status value that might qualify for moral stakeholder status, as in the strong version of Westra’s ethics, or none at all, as in the weak version.

Side comments to Westra – issues for the judgements of ethical records

Two side comments are given in relation to the judgements of ethical records. One is about the Harm Principle and the Equity Principle, while the other is about basic and non-basic needs and preferences.

The Harm Principle and the Equity Principle – framework for judgements of ethical records

This is just to recall again that the Harm Principle and the Equity Principle, as described in Chapter 3 (Method – a post-normal science approach), were chosen to represent the framework for the judgements of ethical records in the present investigation. This was done on the basis of Westra’s notion that these principles are important when dealing with policy options.

Flourishing – basic and non-basic needs

Westra says that non-basic and luxury needs will have lower priority, dependent on what the Earth can tolerate and what the societies are willing to risk. As described for Taylor’s
references to basic and non-basic interests and for deep ecology’s emphasis on vital needs, this should support the relevance of differentiating between basic life support needs and the more non-basic and luxury needs and preferences.

**Side comments to Westra – issues related to ecological literacy**

Two side comments are given to issues related to ecological literacy. The first is about ecological literacy as such, while the second is about supra-individual ecological entities. The second side comment addresses that the weak version of Westra’s environmental ethics might represent an environmentally strong version of traditional inter-human ethics.

**Ecological literacy – much deep thinking**

When Westra says that much deep thinking is necessary for practical resolutions, this gives, as mentioned, associations to my comment on Regan’s statement about leaving it to others to work out environmental ethics. In the same way as I interpret Regan’s idea of inherent value to represent a kind of attitude or world view that influences and decides how this should be done, I see Westra’s reference to deep thinking to be about the same. This means that ecological literacy might be regarded as a basis for the deep thinking in Westra’s ethics as well. Westra actually seems to address this when she, in her second categorical imperative (1b), mentions the need for an understanding of all natural processes and laws as one of the moral implications of the principle of integrity. This refers to the knowledge part of ecological literacy, much the same way as when Taylor contends that the biocentric outlook on nature should be consistent with all known scientific truths. It should be recalled that when Taylor in this connection says that the biocentric outlook would constitute a coherent, unified and rationally acceptable picture of the total world, I link this with Westra’s statement mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), that the principle of integrity would be effective by proposing a goal that is universally acceptable for the environmental standpoint.

**Supra-individual ecological entities – environmentally strong version of traditional inter-human ethics?**

In relation to the supra-individual ecological entities, such as ecosystems, the weak version of Westra’s environmental ethics focuses, as mentioned, on the anthropocentric functional and structural ecosystem aspects of sustainability. It might be said that the weak version represents a kind of environmentally strong traditional inter-human ethical position. This is in the sense
of a traditional inter-human ethics added with a great extent of ecological literacy regarding ecosystems’ complexities and uncertainties. It is conceivable that if an increased ecological literacy results in strong focus on the evolutionary abilities, the value perception might tend towards building on the nonanthropocentric structural ecosystem aspect of sustainability and by that represent the strong version of Westra’s environmental ethics. The practical implications of this might then either be seen as representing a weak version of Westra’s environmental ethics added with a great extent of ecological literacy, or even further that they represent a particularly environmentally strong version of traditional inter-human ethics where ecological literacy plays a dominant role.

5.5 Weak anthropocentric ethics – *Kantian reflections and contemporary positions*

Lastly in the development of the conceptual model and finalising of the inner worth table is the weak anthropocentric ethics. I have selected some Kant-related ethical reflections and four contemporary anthropocentric positions to represent such weak anthropocentric ethics. Together these will show how the efforts of biocentric and ecocentric ethics to broaden the ethical scope into more holistic environmental ethical approaches have influenced contemporary anthropocentric ethics. It should be recalled that Norton (1984 p.133-134, 1993 p.275-276) distinguishes weak anthropocentric ethics from strong anthropocentric ethics by the affirmation that nonhumans and natural objects can, in addition to felt preference, satisfy what he refers to as considered preference.

5.5.1 Kant-related ethical reflections – *four elaborations & two contemporary approaches*

First in the Kant-related reflections are some elaborations given about four different issues related to humans’ moral status as beings that on the basis of rationality are said to be ends in themselves. These are issues addressing questions of whether the value-conferring properties of rationality, reason and free will might be extended to nonhumans, and how these value-conferring properties might be applied in relation to various degrees of human rational capacities. Then follow two contemporary approaches to Kant’s anthropocentric ethics represented by Jens Saugstad and Christine Korsgaard. They base their arguments on Kant’s
anthropocentric ethics, but at the same time they extend this ethics to meet the criticism from the nonanthropocentric ethical positions.

First issue – chimpanzees and gorillas
The first of the four issues is about the possibilities of extending Kant’s ethics into biocentric ethics. Callicott (2002 p.6) refers in this connection to research on chimpanzees and gorillas where the goal is to find if they are able to master rudimentary language skills and to express themselves creatively. Savage-Rumbaugh et al. (1998 p.1) refer in this connection to experiments with a chimpanzee showing that it was capable of speaking English of a complexity equal to that mastered by a normal two and a half year old human child. By language skills, Callicott (2002 p.6) explains, is meant more than the case as also described by Descartes, where parrots just repeat words probably without any meaning for them or any creative thinking behind the expressions. If it could be found that chimpanzees and gorillas have some degree of rationality, this would undermine the anthropocentric position, but only a little, Callicott says. I believe he here has in mind that the chances of finding rationality will diminish quickly when moving down to lower order animals and plants. Saugstad (2000 p.149) as well is sceptical about the possibility that higher order primates master language skills and can express themselves creatively. He refers to studies of animals’ language skills by Walker (1983 p.378) and the philosophical writings of Leahy (1991 p.162).

Second issue – the possibility of extraterrestrial beings
The second issue concerns some reflections about Kant’s ethics in relation to speciesism. Regan (1980 p.105) indicates that Kant’s ethics could be characterised as speciesism. Since speciesism is defined in parallel with racism and sexism, the term gives rather negative associations, and is, as Wetlesen (1999 p.296) says, ‘not to be a very desirable position to take’. One of the successful arguments used against speciesism, he says, is that if we should meet a responsible moral agent belonging to some non-human species, terrestrial or extraterrestrial, most of us would presumably agree to ascribe moral status to this being. Wetlesen says further that neither Kant nor other philosophers such as Aristotle, Augustine or Aquinas have actually grounded moral status in the membership in the biological species of mankind. They have all related this to free will and the capacities of reason and language. Callicott (2002 p.6) supports this view, and says that ‘Kant himself is quite careful to avoid speciesism’. Callicott means that Kant consistently held open the possibility that there may be other than human rational beings, but that he never specified who these might be. Some have
suggested, he says, that Kant was thinking of God or other divine beings, while others have suggested rational beings on other planets. It might even be the case, Callicott asserts, that Kant held open the possibility that there could be non-human rational beings found on the planet Earth.

**Third issue – hunting the severely mentally handicapped?**

The third issue concerns reflections about Kant’s ethics in light of the argument from marginal cases, which is also mentioned in relation to Regan’s ethical theory. This is about the consequences we might face if our relations to humans should be based on the same attitude as when valuing the rational capacity, language skills and creativity of animals. To illustrate this, Callicott (2002 p.7) says that if we equitably apply Kant’s ethical theory to infants, the severely mentally handicapped and the abjectly senile as to all other beings that are things which may be used merely as means, then the following could happen:

> [W]e could justifiably perform the same painful and destructive biomedical experiments on unwanted non-rational infants that we inflict on non-rational nonhuman animals; we could open a hunting season on the severely mentally handicapped; and we could make pet food out of the abjectly senile. (Callicott 2002 p.7)

It is due to ‘[s]uch abhorrent implications of Kant’s moral philosophy’, Callicott (2002 p.7) states, that nonanthropocentric theorists were provided with an opportunity to revise these specific conceptual contents of Kant’s form of moral argument. This worked so as to include the marginal cases in the class of persons, and by this ‘rescue them from the class of things’, Callicott says. The nonanthropocentric theories also work so as to retain Kant’s form of moral argument, which, after all, Callicott acknowledges, has been so compelling in Western ethical thought. The form of ethical architecture that was retained by this is Kant’s close linkage of moral ends, intrinsic value and value-conferring properties, Callicott says further, with reference to the various alternatives to rationality that are proposed by writers such as Singer, Regan, Goodpaster and Taylor.

Another way to rescue the marginal humans from the class of things that could be used merely as a means, is described by Wetlesen (1999 p.301-302) on the basis of Saugstad’s (1994) Kantian related humanist view. Wetlesen interprets Saugstad as distinguishing between capabilities and abilities as two kinds of moral capacities. Wetlesen says, as mentioned in Chapter 3 (Method – a post-normal science approach), that in order to be a moral agent, a
person must be able to take a moral responsibility for his or her actions and to be answerable for them. According to Wetlesen, this then requires not only the capabilities of free will, reason and a linguistic competence, but also the operative ability of realising these capabilities in practice. A subject may, he says, have the capabilities of moral agency without having the operative abilities of free will, reason and linguistic competence. In that case the subject is a moral person without being a moral agent, Wetlesen explains, since moral personhood should be grounded on the actual capability and not the potential ability. According to Wetlesen, all humans, regardless of intellectual abilities, can therefore be ascribed an equal inherent value as moral persons, based on the capabilities of moral agency. Marginal humans are in this sense rescued from the class of things by being included in the class of moral persons. Wetlesen explains that the term moral agent is often seen in the literature as synonymous or equivalent with being a moral person. Contrary to this, Wetlesen understands Saugstad as interpreting Kant’s concept of a moral person to be generic in relation to that of a moral agent, which implies that the class of moral agents is a subclass of moral persons.

Forth issue – neonate versus zygote

The last issue illustrates the general problem of applying factual properties as value-conferring properties in order to avoid speciesism, as long as all living organisms start their lives as single cells. This is about the ultimate boundary of what it might mean to be a moral person. Regan (1979 p.189, 200) lists babies, the mentally enfeebled and the severely mentally enfeebled, and excludes the irreversibly comatose humans, when he refers to marginal humans assumed to have moral rights. Wetlesen (1999 p.299) has extended the list and describes the term marginal humans to include minors, neonates, foetuses, embryos, zygotes, the severely mentally retarded, the severely brain damaged, the severely senile and those born without a brain. Including foetuses, embryos and zygotes this touches the question of when human life actually begins.

Saugstad (1993 p.173-174) says that the normal human neonate undoubtedly possesses capacities which markedly distinguish it from the zygote. Just as human infants in the Kantian conception are persons with capacities for rationality, distinguishing them from the members of all other species, they are also, Saugstad asserts, distinguished from zygotes. He specifically links this distinction to freedom, the capacity which ‘makes imputable actions possible’. The question, then, is how far down in the ontogenesis of the human offspring the Kantian conception of the person finds application (ibid. p.185). When Saugstad (ibid. p.186-
187) says that the person-constituting property is the free will, he adds that the will, be it free or not, is conceptually connected to sensuously conditioned self-movement. Hence, he says, we cannot attribute a will, and therefore not a free will, to a human foetus until it has such behaviour.

**Saugstad – sympathy and compassion**

Next are the two contemporary approaches to Kant’s anthropocentric ethics, starting with Saugstad. He (1994 p.5) describes a way of understanding the Kantian view, if not in a nonanthropocentric direction, then at least into a position where nonhumans are seen as intrinsically valuable. He (ibid. p.1) builds his arguments on Kant and the strong anthropocentric view that humans enjoy a privileged moral status as compared to nonhumans. This is an anthropocentric view, which he denotes as Humanism. As mentioned, Saugstad, just like Callicott, is sceptical to the possibility that animals, even higher order primates, master language skills and can express themselves creatively.

Saugstad (1994 p.8-9) states that Humanism, based on Kant’s categorical imperative about treating humanity always as an end and never as a means only, can grant animals protection and deem them intrinsically valuable on the basis of moral duties that humans have to themselves, which indirectly are moral duties with regard to animals. He (ibid. p.10) believes that this is the only possible Humanist view, and that it merely needs three emphases and one refinement to withstand its critics. The first emphasis is that humans are morally enjoined to have certain attitudes towards animals such as compassion and gratitude. These attitudes, often called awe for life, are morally required as an instance of respect for ourselves. Therefore, ‘being the objects of these attitudes’, Saugstad claims, ‘animals are invested with intrinsic value, as opposed to being of sheer instrumental value for us’. Secondly, he emphasises that it is ‘an eminently plausible empirical assumption that nature, through the history of evolution, has laid down in us emotions directed against the destruction of animal life’. He connects this with a belief that very few people would deny that such natural feelings serve vital roles on morality. Sympathy and compassion motivates us to care for the suffering of others, he says. Saugstad’s (ibid. p.11) third emphasis is that these natural feelings are not only conductive to morally right actions, but even to morally good actions. He holds clearly, however, that this is about ‘moral duties with regard to animals’ and not ‘duties to them’. It is crucial, he says, to be aware of the distinction between the moral duty and the emotional attitude towards animals. While the attitude is directed at the animals, the moral ground on
which this attitude becomes an obligation is a duty to ourselves. The refinement of the Humanist view that is necessary, Saugstad (ibid. p.12-13) says, is about the assumption that the natural feelings, which we have a moral duty to preserve, only stand in the service of our conduct towards other persons. Saugstad cannot see that it necessarily needs to be like that. Natural feelings against the destruction of life seem to have the auxiliary function of ‘preparing for respect for the humanity in one’s own person’, he concludes.

Saugstad (1994 p.14-15) holds on the basis of the three emphases and the refinement that the moral protection Humanism offers is far better than that yielded by its competitors. This is because it is not committed to the individualism with regard to nonhuman nature that vitiates the nonanthropocentric positions. Humanism provides a moral duty with concern for the environment in general, ecosystems as well as individuals, regardless of their instrumental value for the welfare of humans.

**Korsgaard – endorse the value of our animal nature**

Korsgaard (1996 p.150) refers to pain as the cause of moral deliberations, but this is not the pain as such, but pain as ‘the unreflective rejection of a threat to your identity’. She (ibid. p.147-148) explains the painfulness of pain as a sensation we are inclined to fight. It is the tendency to revolt against the pain and seek to change the conditions that is the character of painfulness. Korsgaard therefore sees pain, both physical and emotional, not as the reason itself to change condition, but as the perception of the reason to change. Linking this to animals, Korsgaard (ibid. p.147) says that when we pity a suffering animal, it is because we perceive a reason for the animal to change its conditions. An animal can therefore oblige us in exactly the same way as a human, she (ibid. p.153) says further. It is because of the way of being, which we share with animals, that we have obligations to them. She (ibid. p.149) follows the lines back to Aristotle to argue why we have these kinds of sensations that lead to the obligations towards animals. Aristotle thought that a living thing has a special kind of form. A living thing is in this sense designed to maintain and reproduce itself, a self-maintaining form, Korsgaard says, with a business in life to preserve its own identity. To say that life is a value is therefore almost a tautology, she (ibid. p.152) states, since a living thing is a thing for which the preservation of identity is imperative.

Wetlesen (1999 p.309-310) says that deliberation of how to act in given situations according to Korsgaard should take place within the horizon of what we have endorsed and identified
ourselves with. Therefore, Wetlesen continues, we have a normative obligation not to act on subjective inclinations which would undermine our practical identity. Korsgaard (1996 p.152) says in connection with this that it is not just as humans, but as sensible animals that we value ourselves and are our own ends. She also expresses very clearly that we have to endorse this value, because if we do not value our animal nature, then we value nothing. She (ibid. p.156) restricts the obligation humans have towards nonhumans to animals, since plants are not conscious and do not therefore have a way of being that they share with us. But still, she admits, she cannot help thinking that we have duties with regard to plants and other beautiful things in nature in the Kantian sense of avoiding bad effect on our human character.

**Value-conferring properties – Kant-related reflections**

Regarding the first issue about whether higher order primates, such as chimpanzees and gorillas, might have the capacity of reason, there seems to be no clear evidence that they share an intellectual capacity on a par with humans. I have therefore found it too speculative to argue that chimpanzees and gorillas, on the basis of the precautionary principle, should be considered to have a universal inner worth on the basis of rationality. On this basis I keep the notion in the inner worth table that no ecological entities might be ascribed a direct moral status value on the basis of rationality.

The same holds for the second issue and the question of whether there might be some other terrestrial or extraterrestrial nonhuman beings with the capacity of reason. It might be argued that such beings might exist and that they should therefore be added to the inner worth table as entities which might qualify for moral stakeholder status in the context of the traditional inter-human ethics. However, the chance that we might encounter terrestrial or extraterrestrial nonhuman beings with the capacity of reason seems to be rather hypothetical and irrelevant in relation to the inner worth table, since it is meant to support practical ethical assessments in real-life situations, which is real-life as we currently experience it. I have therefore also in this connection decided to keep the notion in the inner worth table that there are no known ecological entities that might be ascribed a direct moral status value on the basis of rationality.

The third issue about marginal humans appears too complicated to be handled satisfactorily within the limits of the present investigation. I have therefore decided, despite the risk of being accused of speciesism, to say that the value-conferring properties used in the inner worth table are based on capability. This means not only capability of reason, such as
described by Wetlesen. It means capability that might be regarded as paradigmatic for the kind of ecological entity in question, whether individual or supra-individual.

With regard to the fourth issue, I have decided not to take a stand with regard to the direct moral status value of zygotes. This will be limited to say that all humans, or for that sake any ecological entities, are moral stakeholders if they might have a direct moral status value that qualify for it, without taking a stand on how far down in the ontogenesis of the offspring this might apply. As for the third issue, it is what is seen as paradigmatic for an ecological entity that is taken into account.

Saugstad and Korsgaard – sympathy, compassion and pity for suffering animals

Saugstad says that animals, due to being objects of the attitudes of compassion and gratitude, also called the awe for life, are invested with intrinsic value as opposed to being of sheer instrumental value for us. Supposing that sheer instrumental value means almost the same as purely instrumental value, as described for the inner worth table, it is reasonable to believe that the intrinsic value Saugstad refers to is either of the universal or of the particular inner worth value category. When Saugstad says further that an eminently plausible empirical assumption is that nature, through the history of evolution, has laid down in us emotions directed against the destruction of animal life, it might be asked if this holds true for all kinds of animals or is dependent on personal emotions and preferences. If these emotions are such that they are equally against the destruction of all kinds of animals such as vermin, pets and livestock, then Saugstad’s intrinsic value might be interpreted as relating to universal inner worth. If, on the other hand, the emotions entail that animals such as vermin, pets and livestock are valued differently, then Saugstad’s intrinsic value might rather be interpreted as relating to some kind of particular inner worth. This is more of the kind where we wish to kill rats, do everything well for our dog and look forward to a tasty piece of steak or a salmon filet. It might further be asked if the emotions laid down in us are not only directed towards animals, but also towards plants, landscapes and maybe even against the destruction of beauty, aesthetics and art in general. This means that humans’ awe for life might have some similarity with the awe for works of art. This similarity is in the sense that humans in general like animals, beauty and art, but have different preferences to what kind of animals, beauty

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14 Wetlesen says that paradigmatic cases of entities have factual properties which give the relevant similarities to other cases, and a basis for analogical extensions (1999 p.292).
and art they like. If this is the case, it would strengthen the impression that the intrinsic value
Saugstad refers to tends towards representing a kind of particular inner worth.

When Saugstad says that sympathy and compassion motivates us to care for the suffering of
others, then this sounds like it tends towards a hedonistic or semi-proper nature-environmental
ethical position based on sentience as a value-conferring property. But since Saugstad holds
clearly that this is about moral duties with regard to animals and not duties to them, and
emphasises that we only have direct moral duties to ourselves, he probably would not support
the idea of a universal inner worth of animals based on sentience as a value-conferring
property. Saugstad’s reference to sympathy and compassion has probably more in common
with the Kantian attitude of love towards animals and the issue of observation, awareness and
ecological literacy. This will be discussed further in the side comments.

A final comment to Saugstad’s approach to Kant’s anthropocentric ethics is linked to his
statement that the moral protection Humanism offers is far better than that yielded by its
competitors. He says that Humanism provides a moral duty with concern for the environment
in general, regardless of its instrumental value for the welfare of humans. Since this is based
on the same natural feelings against the destruction of life, this no more than for individuals
points towards universal inner worth, but rather towards particular inner worth.

When Saugstad states that Humanism, by the natural feelings against the destruction of life
provides a moral duty with concern for the environment in general, this has some similarities
with Korsgaard when she admits that she cannot help thinking that we have duties with regard
to plants and other beautiful things in nature. Since she is thinking in the Kantian sense of
avoiding a bad effect on our human character, it sounds like she also tends towards the
particular inner worth way of valuing these plants and other beautiful things in nature.

However, when Korsgaard says that we pity a suffering animal because we perceive a reason
for the animal to change its conditions, she might be interpreted as tending towards giving
animals a universal inner worth. This is especially so when she says that it is because of this
way of being, which we share with animals, that we have obligations to them. This sounds
like she points at the capacity for suffering and thus sentience as a value-conferring property.
This impression is strengthened when she says that it is not just as humans, but as sensible
animals that we value ourselves and are our own ends, and further expresses that we have to
endorse this value. She even says that if we do not value our animal nature, then we value nothing.

On the other hand, when Korsgaard follows the lines back to Aristotle to argue why a living thing is designed to maintain and reproduce itself, a self-maintaining form, she seems to move closer towards Goodpaster’s and Taylor’s expressions of being alive and teleological centres of life as value-conferring properties. But as long as she perceives this almost as a tautology, she most probably would not agree that being alive could be a value-conferring property.

Mind photo 5.10 Inner worth table – added with Kant related reflections

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Proposed value-conferring properties</th>
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<td>Hedonistic or semi-proper nature-environmental ethics</td>
<td>Self-consciousness, consciousness, sentence</td>
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<th>Distinctly less than humans’</th>
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<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses or supra-individual ecological entities such as species and ecosystems</td>
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<td>Direct moral status value that might qualify for moral stakeholder status</td>
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<td>or no universal inner worth, but particular inner worth, Life domain</td>
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<td>Rationality</td>
<td>Hedonistic or semi-proper nature-environmental ethics</td>
<td>Self-consciousness, consciousness, sentence</td>
</tr>
<tr>
<td>Proper nature-environmental ethics</td>
<td>Being alive or having structural integrity, stability, beauty, Life on Earth and wholeness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Possible degrees of direct moral status value</th>
<th>Equivalent with humans’</th>
<th>Less than humans’</th>
<th>Distinctly less than humans’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological entities with possible universal inner worth, Life domain</td>
<td>None</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses or supra-individual ecological entities such as species and ecosystems</td>
</tr>
<tr>
<td>Direct moral status value that might qualify for moral stakeholder status</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>or no universal inner worth, but particular inner worth, Life domain</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Recreational values</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Aesthetic values</td>
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<td></td>
<td></td>
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<tr>
<td>Scientific values</td>
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<td></td>
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<tr>
<td>Evolutionary values</td>
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<tr>
<td>Symbolic values</td>
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<td></td>
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<tr>
<td>Religious values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value, Life domain</td>
<td></td>
<td></td>
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<tr>
<td>Biological domain</td>
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<tr>
<td>Life support values</td>
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<tr>
<td>Cultural domain</td>
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<td></td>
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<tr>
<td>Economic values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value</td>
<td></td>
<td></td>
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<tr>
<td>Biological domain</td>
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<tr>
<td>Life support values</td>
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<tr>
<td>Cultural domain</td>
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<td></td>
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<tr>
<td>Economic values</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In summary then, it is difficult to find in the four issues, or in their approaches to Kant’s anthropocentric ethics, that Saugstad and Korsgaard add anything new to the value-conferring properties of the inner worth table.

The inner worth table therefore remains unchanged, as shown in mind photo 5.10.

**Side comments to Kant-related reflections – relevance of the conceptual model**

One side comment based on Callicott’s comments to the third issue is given in relation to the conceptual model. This is a confirmation of the relevance of the selected value-conferring properties.

**Value-conferring properties – confirm relevance**

Callicott actually confirms in two ways the relevance and sensibility of the use of value-conferring properties in the inner worth table. This is when he says that the nonanthropocentric theories work so as to retain Kant’s form of moral argument, which has been so compelling in Western ethical thought. Firstly, by saying that the form of ethical architecture that was retained is Kant’s close linkage of moral ends, intrinsic value and value-conferring properties, he confirms the logic of using value-conferring properties as a basis for ascribing direct moral status value. Secondly, he confirms the sensibility of the selection of value-conferring properties when he refers to the various alternatives to rationality that are proposed by theorists such as Singer, Regan, Goodpaster and Taylor. I believe he then thinks of alternatives such as self-consciousness and consciousness.

Also Saugstad’s and Korsgaard’s theories demonstrate, as I have described, by their references to sympathy and pity, the relevance of having particular inner worth as a value category to sort values behind biodiversity that are not merely purely instrumental, but which do not qualify for a universal inner worth either.

**Side comments to Kant-related reflections – issues related to ecological literacy**

Two side comments are given about the question of ecological literacy in connection with the ethical approaches of Saugstad and Korsgaard. One is about ecological literacy as such, while the second is about supra-individual ecological entities.
Ecological literacy – *sympathy and pity for a suffering animal*

Both Saugstad and Korsgaard, like Callicott, refer to sympathy or related terms as the basis for their ethical approaches. Saugstad says that sympathy and compassion motivates us to care for the suffering of others, while Korsgaard says it is because we feel pity for a suffering animal that we have obligations to them. Neither Saugstad nor Korsgaard refer directly to any kinds of contact with, observations of and knowledge about animals behind the sympathy for them. This is different from what Callicott does when he, as I describe it, refers to the knowledge part of universal ecological literacy as the trigger to sympathy and fellow-feeling for fellow members of the biotic community. Saugstad refers to the eminently plausible empirical assumption that nature, through the history of evolution, has laid down in us emotions directed against the destruction of animal life, while Korsgaard says that we pity a suffering animal just because of the way of being, which we share with the animals.

If evolution has in fact laid down in us emotions against the destruction of animal life and to pity a suffering animal, in such a way that it works without any cultural influence or learned behaviour, then it might be expected, as mentioned, that all humans would value animals the same way, whether they are vermin, pets or livestock. I doubt that this is the case, and believe that all feelings and attitudes towards animals in addition to the evolutionary basic feelings are modified in accordance with cultural influences, experiences and learning. This means not only that vermin, pets and livestock are valued differently, but that some people might value a rat as a vermin while others would regard it as a pet, and some value dogs as pets, while others do not like them, and some even see them more as livestock, or at least as a food source.

This means that I have difficulties in seeing other than that the emotions which Saugstad and Korsgaard base their ethics on must to some degree also be of the type Kant advises when he says that we should be in contact with and learn from animals because the more we come in contact with them the more we love them. I therefore believe that there must be some elements of the knowledge part of ecological literacy involved also in Saugstad’s and Korsgaard’s ethics.

**Supra-individual ecological entities – anthropocentric aspects of sustainability**

As for the strong anthropocentric ethics, I believe that it should be reasonable in relation to the weak anthropocentric ethics to think that the references to sympathy, compassion and feelings
of pity would apply in relation to supra-individual ecological entities. This means again that contact with and observation of nature in general would make that we would love also supra-individual ecological entities. The result might then be that the weak anthropocentric, just like the strong anthropocentric ethics, represents a perception that tends towards the anthropocentric functional and structural ecosystem aspects of sustainability. Also here the perception that tends towards the anthropocentric structural ecosystem aspect of sustainability perception might be strengthened in pace with extensions of the knowledge and the care part of ecological literacy. However, just like the strong anthropocentric ethics, the weak anthropocentric ethics would logically never end, I believe, with a perception that accepts the nonanthropocentric structural ecosystem aspect of sustainability.

5.5.2 Weak anthropocentric ethics – *four contemporary positions*

This section is a discussion of four weak anthropocentric positions in relation to the inner worth table. Based on Armstrong’s and Botzler’s (1993 p.275-276) presentation of weak anthropocentric positions, William H. Murdy, F. Fraser Darling, Stephen Jay Gould and Bryan G. Norton are chosen as representatives of the four positions.

**Murdy – biological ends for themselves**

The first representative of weak anthropocentrism, Murdy, is maybe the one that represents the weakest form. Murdy (1975 p.1168-1169) holds that all species in biological terms exist as ends for themselves and therefore should be ascribed value. By biological ends for themselves, he refers to the way all living organisms seek to maximise their own reproductive success. In addition he says that since human survival and well-being depend on the health and stability of the ecological support systems, humans should, from an enlightened self-interest perspective, ascribe value to all elements of the natural world. Murdy describes his anthropocentric attitude by saying that though he may affirm that every species has intrinsic value, he will behave so that his own survival and that of the human species are valued higher that the survival of animals and plants.

**Darling – ideal noblesse oblige attitude**

Darling (1969 p.298-300), the second representative of weak anthropocentrism, says that humans are biological aristocrats in the sense that they have ‘dominion over the creatures, the plant cover and the very landscape of this planet’. By this he indicates that humans should
have a kind of ideal *noblesse oblige* attitude which could be expressed by saying that ‘the aristocrat is the servant of his people’. Darling is aware of the dubious association and strong opposition many may have with regard to the virtue of aristocratic ideal, but he takes it nonetheless as the basis of an ethic of responsible behaviour between humans and their total environment. ‘This includes all other living things,’ he says, ‘the landscape, air and water, and the various products of art in man’s history, art being considered as an emanation of nature’.

Western societies, having adopted the Judeo-Christian religious tradition, have not only banished all other living things from the partnership of God and humans, he says further, ‘but has developed the convenient conviction that God created the rest of living things for the *use* and delectation of man’. He is not greatly moved, he says, when he hear supporters of national parks argue that living things have educational value, that the beauties of nature give pleasure and that they are of scientific value. This attitude is essentially ‘not far in advance of that of the timber merchant’. He admits, however, that ecology as a science contributes to an understanding and insight that makes humans readier to accept the ethical principles of conservation. On the other hand, he holds that the ethical attitude towards nature has grown as our condition has deteriorated. Conservation and care is therefore ‘not so much ethical as hygienic concerned with survival’.

**Gould – Golden Rule**
The third of the representatives of weak anthropocentrism, Gould (1990 p.30), also bases his environmental ethics on enlightened self-interest. His conclusion is according to Armstrong and Botzler (1993 p.310) patterned after the Golden Rule, by stating that humans ought to treat nature as they would want to be treated by nature. This is not based on a belief that nature has some kind of absolute value or that there are some unconditional moral laws demanding humans to follow such an imperative. It is more a practical recognition of the fact that our planet ‘holds all the cards and has immense power over us’, as Gould (1990 p.30) expresses the human dependency on a well stewarded planet.

**Norton – denial of intrinsic value, envisages pragmatic view**
The last of the four weak anthropocentric authors, Norton (2003 p.7), is very clear in his denial of the relevance of intrinsic value in nature. Norton basically disagrees with his colleagues in environmental ethics who argue that we should create a distinctive language and subject matter, the intrinsic value of nature, as the subject of environmental ethics. He (1984 p.134, 1991 p.201-202) says that environmental protection is better served by a careful
consideration of preferences and that we often may find that conflicting values support the
same policy. As an example Norton mentions that those who value waterfowl for hunting and
those who value waterfowl for watching have common interests in supporting waterfowl
habitat preservation and restoration policies. Callicott (2002 p.12) associates Norton with a
group of pragmatists who believe that philosophers should help lay people figure out what to
do in the context of specific problems, rather than spend time and probably create unnecessary
divergence by exposing potentially different attitudes regarding intrinsic value. Norton (2003
p.7) envisages a theory-building in the service of developing and broadening consensus, and
not for the sake of theory itself. He argues for a new problem-oriented approach to science.
Instead of being based on the ideal of the science of physics, it should be able to handle a
great variety of political issues.

Norton (ibid. p.11) is in this connection a proponent of what he calls the 'convergence
hypothesis'. This means, as I understand it, that he believes more in seeking consensus on the
practical level, than in creating a theoretical discourse arena that results in a great variety of
diverging positions, far away from ordinary peoples’ reality. Norton says that this pragmatic
view, if reasonably interpreted and translated into appropriate policies, will represent a
suitably broad and long-sighted anthropocentrism which will advocate the same policies as
nonanthropocentric ethics.

Through his research, Norton (ibid. p.10) found that activists do not see any point in
discussing the question of how we should value nature and natural objects. They take it as
obvious that these objects have value. He asks therefore what it is that is wrong with ethicists
who seem to provide answers to questions no activists find pressing. Part of the reason, he
says, is that the language of activists is a language of action. More generally important,
Norton says, is the language of politics, which is evolved in order to do things. Philosophy
works best, he (ibid. p.11) asserts, when it engages language and meaning in problematic
situations. This is when it is driven by the pragmatists away from the language of pure reason
and logical perfection into the maelstrom of action politics and decision making.

According to Norton (ibid. p.1), environmental philosophers should adopt a new role in the
process of environmental policy development. They should reduce their appeal to abstractions
and arguments regarding universal principles, and become more pluralistic and problem-
oriented. He predicts a new era of environmental philosophy that is more focused on specific
place-based environmental problems, and that this should be based on a better understanding of the complex processes by which environmental policy should be proposed, modified and implemented in modern democratic societies. Looking at the situation from the viewpoint of policy and practice, and recognising the need for a unifying concept to anchor normative theories of environmental protection, he (ibid. p.3) sees the idea of sustainability as a promising candidate. He (ibid. p.4) says that there is a need to search for an interdisciplinary theory of sustainability. The goal of this new approach is to forego general arguments regarding the nature of environmental value, and strive to improve communication and cooperation through improved formulation in the search for more sustainable policies in the particular situations. One challenge in this connection is, he (ibid. p.7) says, trying to integrate specialised knowledge into a rational decision process. Part of this, he (ibid. p.11) asserts, will be to transcend the fact-value dichotomy in a way that creatively integrates science and human values in the search for better environmental policies.

**Value-conferring properties – add nothing**
None of the four contemporary weak anthropocentric positions addresses that ecological entities might have any kind of universal inner worth. The only slight indication is Murdy, when he holds that all species exist, in biological terms, as ends for themselves and should therefore be ascribed value because they are living organisms that seek to maximise their own reproductive success. This gives associations to the ecocentric kind of value-conferring property such as being alive. He is, however, also clear in his statement that the survival of humans should be valued higher than animals and plants.

Darling’s focus seems to be on the ideal *noblesse oblige* attitude towards the total environment, including art. Gould addresses the need to be aware of the immense power nature has over us, while Norton very clearly argues against anything like intrinsic value. He argues that it is a waste of time and effort to be concerned with such questions. This might mean that he would be critical of the development of the conceptual model in the present investigation. This will be commented further in the following side comments.

Without any indications of possible value-conferring properties, and especially with Norton’s clear denial of intrinsic value, it is reasonable to believe that the four representatives of contemporary weak anthropocentric ethics would agree in the context of the traditional inter-
human ethical position in the inner worth table. They would thus probably not support the idea that ecological entities might have inner worth.

The four contemporary weak anthropocentric positions seem therefore not to add anything to the inner worth table as it is developed by now, unless Norton’s position should undermine the whole idea behind the table. But until this is considered when handling Norton’s position in the following side comments, the final version of the inner worth table, based on the strong anthropocentric, the biocentric and the ecocentric ethics and supplemented with the various contemporary approaches to anthropocentric ethics positions, is as shown in mind photo 5.11.

**Mind photo 5.11  Inner worth table – final**

<table>
<thead>
<tr>
<th>Inner worth of ecological entities – final (Ecocentric ethics, biocentric ethics, and strong and weak anthropocentric ethics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical positions</td>
</tr>
<tr>
<td>Proposed value-conferring properties</td>
</tr>
<tr>
<td>Possible degrees of direct moral status value</td>
</tr>
<tr>
<td>Ecological entities with possible universal inner worth, Life domain</td>
</tr>
<tr>
<td>or no universal inner worth, but particular inner worth, Cultural domain</td>
</tr>
<tr>
<td>Life support values</td>
</tr>
<tr>
<td>or no universal inner worth, but purely instrumental value Biological domain</td>
</tr>
<tr>
<td>Life support values</td>
</tr>
</tbody>
</table>

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Side comments to weak anthropocentric ethics – relevance of the conceptual model

Three side comments are given in relation to the relevance of the conceptual model. The first is about possible similarities between the valuation of nature and the valuation of art. The second and the third are both comments related to Norton’s statement that philosophers should not spend time on discussing intrinsic value.

Particular inner worth – similarities with the valuation of aesthetic and art

In connection with Saugstad’s ethical approach, I ask if the emotions laid down in humans by evolution are also against the destruction of beauty, aesthetics and art in general. Linked to this is Darling’ comment that an ethic of responsible behaviour between humans and their total environment includes all other living things, the landscape, air and water, and the various products of art in man’s history. He says that art is in this way considered as an emanation of nature. This is interesting in connection with the understanding of the particular inner worth. By referring to art, it may be easier to understand the relevance and the need for the value characteristic of particular inner worth. This is in the way that art can hardly be said to have a value as an end in itself and thus a universal inner worth. But at the same time it is more than the purely instrumental value it might represent if sold on the market. This kind of extra value in addition to the purely instrumental, and which is not a universal inner worth, is then the particular inner worth.

Further, as a support to the relevance of the particular inner worth value category is when Norton mentions aesthetic values as part of the world view. He by this also addresses, as I see it, the need of an anthropocentric valuation of ecological entities other than purely instrumental. The particular inner worth value category might in this connection be seen as an extension of the aesthetic value part of the world view Norton refers to.

Moral stakeholder status – moral obligation to clarify

When Norton says that philosophers should help lay people figure out mutual interests, rather than spend time and probably create unnecessary divergence by exposing possible different attitudes regarding intrinsic value, this might be interpreted in two ways, dependent on whether intrinsic value is understood to represent universal or particular inner worth. If Norton thinks in the way of universal inner worth, then he might be interpreted as meaning that he is positively sure that no ecological entities might have any kind of direct moral status value that qualify for moral stakeholder status. This is a fair enough position to take
personally. If, however, he believes that this position will achieve a universal recognition and be supported by all humans, then it is more doubtful, and probably not a very desirable position to take. This is especially so on the basis of his goal of broadening the consensus. It might actually be perceived to be immoral not to inquire into whether ecological entities might be ascribed a direct moral status value that qualifies for moral stakeholder status. This is exactly why research question “Sustainability for whom?”, about direct moral status value, is addressing in the present investigation.

However, if Norton thinks in the way of particular inner worth, then it might be possible to agree that any talk about intrinsic value is unnecessary. This is especially so if intrinsic value appears as an indistinct and vaguely defined buzzword, such as described in Chapter 1 (Introduction – research area). Nonetheless, an absolutely necessary premise for supporting Norton in this case is that the question of moral stakeholder status be settled. If that is done, then there should no problem in agreeing with Norton in his focus on seeking consensus on the practical level, or to think in the way of consensus and his convergence hypothesis. This is just what research question “Sustainability of what?”, is about. But this should be on a participatory basis involving all relevant moral stakeholders and not only activists and pragmatic environmentalists, which Norton specifically refers to. It is in this connection a little alarming when Norton says that nature will be secured optimal protection by joining all conservation interests and trusting the efforts of pragmatic environmentalists. He seems to take it for granted that all humans will agree with the way environmentalists may value biodiversity. This sounds like a situation involving privileged knowledge, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions). Norton refers to this kind of attitude when he says that activists do not see any point in discussing the question of how we should value nature and natural objects, and that they take it as self-evident that these objects have value without really qualifying the values. This is the same kind of attitude that is mentioned in Chapter 3 (Method – a post-normal science approach), where Takacs refers to Ehrlich and a number of other biologists saying that they merely have the feeling that biodiversity has a value that needs protection, without qualifying why.

In summary, this shows even clearer the relevance of developing the conceptual model for the purpose, at least, of clarifying the possible moral stakeholder status of ecological entities. Then, when moral stakeholder status is settled, it would as mentioned be no problem to agree with Norton’s “convergence hypothesis” about seeking consensus on the practical level if that
involves a kind of participatory process involving all affected moral stakeholders. However, it is not easy to agree with Norton if he means that the question of moral stakeholder status is irrelevant. Such an attitude, I maintain, should be perceived as rather immoral.

**Sustainability and place-based problems – participatory processes and post-normal science**

In any case, Norton seems to support the ideas of post-normal science and the participatory approaches when he envisages a theory-building in the service of developing and broadening consensus, and argues for a new problem-oriented approach of science that should be able to handle a great variety of political issues. This seems further to be the case when he says that the goal of this new approach is to forego general arguments regarding the nature of environmental value, and strive to improve communication and cooperation through improved formulation in the search for more sustainable policies in the particular situations. He also adds that part of this will be to transcend the fact-value dichotomy in a way that creatively integrates science and human values in the search for better environmental policies.

In this connection, when Norton says that environmental protection is better served by a careful consideration of preferences, and that we often may find that conflicting values support the same policy, it sounds like he is thinking almost the same way as Næss does in relation to his two first levels in deep ecology. What I think of here is when Næss says that on the basis of a first level with opposite normative positions, it is possible on the second level to end up with almost identical practical conclusions with regard to more case specific norms. All together this serves to support the feasibility and realism of applying post-normal science and the participatory approaches in relation to environmental questions and controversies, as in the present investigation.

What further supports the idea of the present investigation is when Norton says that he predicts a new era of environmental philosophy that is more focused on specific place-based environmental problems. This is in the sense that it supports the efforts in the present investigation of trying to extract the practical implications or consequences following from traditional and contemporary ethical philosophies, and to see how that will work on environmental controversies related to salmon farming in Norway. Norton further supports the participatory approach of the present investigation when he says that a new era of environmental philosophy should be based on a better understanding of the complex processes
by which environmental policy is proposed, modified and implemented in modern democratic societies.

Finally, since the discussion of moral duties in the present investigation is done in the context of sustainability, it is interesting to note that Norton says that he sees the idea of sustainability as a promising candidate for looking at the environmental situation from the viewpoint of policy and practice. He recognises the need for a unifying concept to anchor normative theories of environmental protection, and the need to search for an interdisciplinary theory of sustainability. It is interesting that Norton concludes with sustainability as the leading idea, just as it is done in the present investigation. What he does, however, is, as discussed above, only to address research question of "Sustainability of what?", and not research question of "Sustainability for whom?".

Side comments to weak anthropocentric ethics – issues related to ecological literacy

Again two side comments are given, one about ecological literacy as such, and one about supra-individual ecological entities.

Ecological literacy – enlightened self-interest

When Murdy says that humans should, from an enlightened self-interest perspective, ascribe value to all elements of the natural world, since human survival and well-being depend on the health and stability of the ecological support systems, then this sounds like an attitude issue that gives associations to the knowledge part of ecological literacy. Similarly, the knowledge part of ecological literacy and an attitude of enlightened self-interest are addressed when Darling admits that ecology as a science contributes to an understanding and insight that makes humans readier to accept the ethical principles of conservation. Added to this, he says that the ethical attitude towards nature has grown as our condition has deteriorated. Gould also addresses a link between the knowledge part of ecological literacy and attitudes when he bases his Golden Rule on enlightened self-interest.

Norton seems to base his pragmatic view very much on ecological literacy. This is such as when he predicts a new era of environmental philosophy that is more focused on specific place-based environmental problems, and that this should be based on a better understanding of the complex processes by which environmental policy should be proposed. Similar is his notion that one challenge in this connection is trying to integrate specialised knowledge into a
rational decision process. When recommending a bottom-up approach by joining all conservation interests and trusting the efforts of pragmatic environmentalists, he also seems to address the ecological literacy issue. Further, linked to this, is his saying that weak anthropocentric ethical approaches are compatible with a rationally adopted world view, which in addition to aesthetic values, incorporates sound metaphysics, scientific theories and moral ideals.

Supra-individual ecological entities – *environmentally strong version of traditional inter-human ethics*?

As for the strong anthropocentric ethics, also the weak versions represent value perceptions that tend towards the anthropocentric functional and structural ecosystem aspects of sustainability. Similarly, I also believe that the weak version, despite any increase in ecological literacy, would logically never end with perceptions that accept the nonanthropocentric structural ecosystem aspect of sustainability.

Norton’s saying that weak anthropocentric ethical approaches are compatible with a rationally adopted world view, which in addition to aesthetic values, incorporates sound metaphysics, scientific theories and moral ideals, I find to have some similarities with my interpretation of the weak version of Westra’s environmental ethics. This is in the sense of representing a kind of environmentally strong traditional inter-human ethics added with ecological literacy as a core part. I even say that the strong version of Westra’s environmental ethics might be compared with an environmentally exceptional strong version of traditional inter-human ethics where ecological literacy plays a necessary and crucial role. What is interesting here, I think, is that these two quite opposite philosophical positions, Westra’s holistic ecocentric ethics and Norton’s pragmatic anthropocentric ethics, both can be interpretation in a practical context to represent a kind of environmentally strong traditional inter-human ethics where ecological literacy plays a significant role. This represents then a value perception that tends towards building on the anthropocentric structural ecosystem aspect of sustainability with special strong focus on the evolutionary abilities. Norton might probably agree to this conclusion, while Westra, I believe, would be more reluctant.
5.6 Conceptual model – main conclusions

Seven sections constitute the main conclusions from the development of the conceptual model. The first three relate specifically to the formation of the conceptual model and to the research questions. The first section is a summary of the side comments about the relevance of the conceptual model. The next and most important section is about the three kinds of ethical positions described. Included here is also my conclusion regarding selected ethical positions for the judgements of ethical records in the case study. The third section is about the particular inner worth value category.

Three of the last four sections relate to the side comments about ecological literacy. These are about ecological literacy as a core element in environmental ethics, about ecological literacy in relation to particular inner worth and about the role of science. The last section is about the judgements of ethical records.

5.6.1 Relevance of the conceptual model – side comments

Both in the summary of the strong anthropocentric and the biocentric ethics and in the side comments after I refer to a number of statements or notions that support the relevance of the conceptual model. This refers to topics such as the splitting between the universal inner worth, the particular inner worth and the purely instrumental value categories, the use of value-conferring properties to ascribe direct moral status value and the grading of direct moral status value. Other topics addressed in relation to the relevance of the conceptual model are the problem with buzzwords, the notion of flourishing potentials and the distinction between biological and cultural flourishing in this connection. Linked to this is also the need to distinguish between basic and non-basic interests.

The blurred borderline between universal inner worth and particular inner worth, and the opinion that particular inner worth strictly speaking is instrumental, should also be mentioned. Linked to this is Saugstad’s and Korsgaard’s theories, which by their references to sympathy and pity demonstrate, I think, the relevance of having particular inner worth as a value category to sort values behind biodiversity that are not merely purely instrumental, but which do not qualify for a universal inner worth either. The different references to beauty, aesthetics and works of arts indicate something of the same.
Further, I say that the conceptual model in some way can be seen as a relevant tool for moving from the first to the second level described in deep ecology. This does not mean strictly to move from a range of deep normative positions and fundamental premises to a consensus regarding some case specific norms. It is rather to move from a wide range of normative positions with regard to the inner worth of ecological entities primarily to a mutual understanding of how different parties perceive that ecological entities might have a universal inner worth, and ideally a consensus about this.

A core topic in relation to the relevance of the conceptual model is when I, arguing against Norton, claim that it might be perceived to be immoral not to inquire into whether ecological entities might be ascribed a direct moral status value that qualifies for moral stakeholder status. Due to this I have used some extra pages to discuss this topic as part of the side comments to Norton’s position. I find it promising that Norton seems to support the ideas of post-normal science and the participatory approaches when he envisages a theory-building in the service of developing and broadening consensus, and argues for a new problem-oriented approach of science that should be able to handle a great variety of political issues. But still, before such a process can be done or as part of such a process, my belief is that the research question of ”Sustainability for whom?” needs to be settled and that this can be achieved by help of the conceptual model.

5.6.2 Three ethical positions – inner worth table for the case study

After this summary of side comments about the relevance of the conceptual model, comes what I perceive to be the most important result of or conclusion from the development of the conceptual model. This is the establishment of the three columns in the inner worth table containing the three kinds of ethical positions. The reason why this is most important is that these ethical positions represent a synthesis of how I perceive that the three research questions of the present investigation might be answered. In other words, they demonstrate, as I will explain in the following, the reasonableness and relevance of my suggested answers to the research questions. It should be recalled that my ambition is not to demonstrate this by some hypothetical-deductive approach, but rather to demonstrate this by showing that my suggested answers are qualified, elaborated and supported throughout the investigation by a web of observations and reflections. In this connection I also explain that since my suggested answers
are influenced by the investigation itself there should be no surprise that I will in general conclude that my suggested answers are both reasonable and relevant. The outcome is therefore rather to show how and why my suggested answers to the research questions might be seen as reasonable and relevant.

At the end of this section I present a finalised version of the inner worth table prepared for the case study.

**Concluding remarks – the three ethical positions**

Concluding remarks to the three ethical positions in the inner worth table are given in the following.

Traditional inter-human ethics:
Related to the research question of “Sustainability for whom?”, the first kind of positions, the traditional inter-human ethics, represents the situation where only humans have universal inner worth and qualify for moral stakeholder status. All individual humans should therefore be treated well and none should normally be killed. Since ecological entities do not then qualify for a moral stakeholder status, this represents the situation which I indirectly describe in my suggested answer to the research question as the most practical position to take. I think here of the statement that I find it difficult to talk about the moral stakeholder status of ecological entities.

This also represents the situation where values behind biodiversity are restricted to human needs and preferences within the biological and cultural domains of the kinds I refer to in my suggested answer to the research question of “Sustainability of what?”. These are the purely instrumental values such as food, water, shelter, comfort and economic income and the cultural kinds of values such as adventure, recreation and aesthetics. This will be commented further in the next section about the particular inner worth value category.

The consequences that follow from the traditional inter-human ethics demonstrate further the reasonableness and relevance of the last part of my suggested answer to the research question about moral duties. This is when I say that in situations where no ecological entities are ascribed a direct moral status value that qualifies for moral stakeholder status then humans
may have indirect moral duties towards the ecological entities in the sense of moral duties linked to humans’ needed and preferred values behind biodiversity.

Hedonistic or semi-proper nature-environmental ethics:
The second kind of positions is the hedonistic and semi-proper nature-environmental ethics. They represent situations where some ecological entities have a universal inner worth and are ascribed a direct moral status value that qualifies for moral stakeholder status. For the semi-proper nature-environmental ethics, the moral duty to care for the survival, growth and reproduction of individual ecological entities, is restricted to such as sentient and conscious animals. This involves also prohibition of killing. For the hedonistic nature-environmental ethics, one strong and one weak version are described. The stronger version is an ethics where all sentient animals qualify for moral stakeholder status in the sense that they should not suffer or be killed. This is in practice identical with a semi-proper nature-environmental ethics when based on sentience and consciousness as value-conferring properties that qualify for moral stakeholder status. I have therefore decided to regard this stronger version to be covered by semi-proper nature-environmental ethics. The weaker version, which is then the one I denote as the hedonistic nature-environmental ethics, is when the focus is on the comfort and well-being of sentient animals as long as they are alive, and when painless slaughtering or killing is accepted.

The above represents the situation where I in my suggested answer to the research question of “Sustainability for whom?” recognise that theoretically and philosophically some ecological entities may be ascribed direct moral status values that qualify for a moral stakeholder status. The discussion of the problems related to this demonstrates the reasonableness and relevance of the part of my suggested answer where I say that I find it difficult in practical ethics to talk about the moral stakeholder status of ecological entities. I think here of all the reservations and modifications referred to in the discussion of the different philosophical theories.

With regard to the research question of “Sustainability of what?”, there is nothing in the discussion that points towards other than that ecological entities’ needed and preferred values behind biodiversity are of the biological kind only. This is in accordance with the last part of my suggested answer to this research question.
The hedonistic and semi-proper nature-environmental ethical positions demonstrate further the first part of my suggested answer to the research question about moral duties, where I say that if ecological entities qualify for a moral stakeholder status, then humans will have direct moral duties towards these entities’ needed and preferred values behind biodiversity.

Proper nature-environmental ethics:
The last kind of positions is the proper nature-environmental ethics. This represents the situation where all ecological entities, whether individual or supra-individual, have a universal inner worth based on such as being alive and integrity as value-conferring properties. They are thereby ascribed a direct moral status value that qualifies for a moral stakeholder status. This means that they should be treated well, and that their needs and preferences should be cared for on an equity basis. Individual ecological entities should further normally not be killed and supra-individual ecological entities should not be destroyed. This represents a moral duty not to treat any ecological entities only as means, but to treat them with respect, independent of other interests in those entities.

The proper nature-environmental ethics is problematic because there will probably be few ecological entities available to support human cultural flourishing. This is because available goods and resources should be shared on an equity basis between all ecological entities since these entities are perceived as ends in themselves, and therefore should not be used merely as means.

Referring again to my suggested answer to the research question of “Sustainability for whom?”, the proper nature-environmental ethics then represents the situation where I recognise that theoretically and philosophically not only some, but all ecological entities may be ascribed direct moral status values that qualify for a moral stakeholder status. This situation demonstrates in full the reasonableness and relevance of my comment that I find it difficult in practical ethics to talk about the moral stakeholder status of ecological entities.

The discussion related to the proper nature-environmental ethics supports also the reasonableness and relevance of my suggested answers to the research question of “Sustainability of what?” and the research question about moral duties. These are that ecological entities’ needed and preferred values behind biodiversity are of the biological kind.
only, and that if ecological entities qualify for a moral stakeholder status, then humans will have direct moral duties towards them.

**Inner worth table - finalised for the case study**

Mind photo 5.12 shows the inner worth table finalised for the case study. One change has been done. This is to remove the notion of semi-proper nature-environmental ethics in the heading of the column in the middle. The reason for this is explained in the following.

**Mind photo 5.12  Inner worth table – case study**

<table>
<thead>
<tr>
<th>Ethical positions</th>
<th>Traditional inter-human ethics</th>
<th>Hedonistic nature-environmental ethics</th>
<th>Proper nature-environmental ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proposed value-conferring properties</strong></td>
<td>Rationality</td>
<td>Self-consciousness, consciousness, sentience</td>
<td>Being alive or having structural integrity, stability, beauty, Life on Earth and wholeness</td>
</tr>
<tr>
<td>Possible degrees of direct moral status value</td>
<td>Equivalent with humans’</td>
<td>Less than humans’</td>
<td>Distinctly less than humans’</td>
</tr>
<tr>
<td><strong>Ecological entities with possible universal inner worth,</strong></td>
<td>None</td>
<td>Mammals, birds, reptiles, amphibians, fishes(?) and some invertebrates(?)</td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses or supra-individual ecological entities such as species and ecosystems</td>
</tr>
<tr>
<td>Life domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct moral status value that might qualify for moral stakeholder status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>or no universal inner worth, but particular inner worth,</strong></td>
<td>Mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems</td>
<td>Fishes(?), invertebrates, plants, microorganisms like bacteria, viruses and supra-individual ecological entities such as species and ecosystems</td>
<td>None</td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreational values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetic values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evolutionary values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbolic values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>or no universal inner worth, but purely instrumental value</strong></td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
<tr>
<td>Biological domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life support values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic values</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I perceive the hedonistic nature-environmental ethics on the one hand and the semi-proper and proper nature-environmental ethics on the other to represent two basically different positions with regard to killing. The difference is that the hedonistic nature-environmental ethics allows
painless killing of nonhuman moral stakeholders, while the others do not. I take this into
consideration for the case study in the next two chapters, where I have decided to make
judgements of ethical records in the context of all three kinds of ethical positions. For the
practical handling of this, I will therefore not use the semi-proper nature-environmental
ethical position, but focus on the main distinctions between the traditional inter-human ethics,
the hedonistic nature-environmental ethics and the proper nature-environmental ethics, as this
is shown in mind photo 5.12.

5.6.3 Particular inner worth – does what expected

My conclusion with regard to the particular inner worth value category is that it during the
development of the conceptual model, more or less works as I had expected and hoped. One
part of this conclusion relates to my suggested answer to the research question of
“Sustainability of what?” where I say that the values behind biodiversity that moral
stakeholders need or prefer are either of the biological or the cultural kinds. This was
demonstrated both by the references to Rolston’s inventory list in Chapter 3 (Method – a post-
normal science approach) and by references in the present chapter. Another and more
important part of the conclusion is that the particular inner worth value category, as I see it,
helps clarify the distinctions in values behind biodiversity embodied in the two research
question of “Sustainability for whom?” and “Sustainability of what?”, and thus also helps to
avoid the use of undefined buzzwords. I am not saying, it should be emphasised, that I see the
particular inner worth value category as the only way of achieving this, but that I see it as one
feasible way.

The particular inner worth value category might help to make clear in two ways, I think,
which ecological entities might really qualify for a moral stakeholder status.

Awareness of values behind biodiversity:
One way is that it creates awareness of the possibilities that values behind biodiversity, which
are perceived as not being purely instrumental, on the contrary do not necessarily need to be
non-instrumental in the sense that we have direct moral duties towards them. It is for these
kinds of intermediate value perceptions, where there is a need to distinguish them form the
purely instrumental value category, that I find particular inner worth to be convenient. This
makes it easier, I think further, to focus strictly on universally accepted value-conferring
properties for ascribing a direct moral status value to ecological entities. Descriptions of
universal inner worth are thus devoid of undefined buzzwords, by leaving the use of such words to be an option within the particular inner worth value category. This is, as mentioned in Chapter 1 (Introduction – research area) when using terms such as sustainability, biodiversity, next generation, integrity, intrinsic value and aesthetic in support of environmental protection without having properly defined them.

Future value-conferring properties:
Another way is that the particular inner worth value category might be of help for a possible future development of proper nature-environmental ethical positions. This is in the sense of finding whether some of the properties that pertain to ecological entities with a particular inner worth also might be used as universal value-conferring properties for ascribing a direct moral status value. I have currently difficulties in finding examples of such properties. However, I am not far from seeing that any properties of the aesthetic kind, just like we value art work, might work as candidates for being accepted as universal value-conferring properties. But on the other hand, this task might be just as huge and impossible as finding universally accepted criteria for what is good art.

5.6.4 Ecological literacy – core in environmental ethics
Then, a little aside of the three research questions are the side comments about ecological literacy. Already after the discussion of the strong anthropocentric and the biocentric ethics I concluded that ecological literacy in some way or another seems to play a role as a basis for these philosophical theories. This is like the references in the strong anthropocentric ethics saying that being kind to animals will develop good character in us, and that the more we come in contact with animals the more we love them. Likewise, my interpretation of Regan’s idea of inherent value as an attitude based on love, respect, and care for ecological entities, indicates that ecological literacy may play a role. So is also my reference to Goodpaster’s emphasis that the regulative character of the moral consideration ascribable to all living things calls for sensitivity and awareness. Further, as the most explicit exposure of ecological literacy within the biocentric ethics I refer to Taylor. This is such as when he says that the moral attitude of respect for nature should be consistent with all known scientific truths relevant to our knowledge, and when he in this connection refers to scientifically informed and rational thinkers.
Also among the ecocentric ethics I find that ecological literacy plays a role. In the holistic approaches the care part of ecological literacy is specifically addressed by Callicott and Leopold, while Rolston more focuses on the knowledge part. Further, in the weak version of Westra’s environmental ethics I describe ecological literacy to be an essential part. This is in the sense that the weak version, which I say focuses on the anthropocentric functional and structural ecosystem aspects of sustainability, represents a kind of environmentally strong traditional inter-human ethical position where ecological literacy is added as a core part. Also for the strong version of Westra’s environmental ethics I presume that ecological literacy plays an important role.

Finally, as for the strong anthropocentric ethics, I also find that the weak anthropocentric ethics have linkages to ecological literacy. Some of them with special focus on the care part, such as Saugstad and Korsgaard, and others with more focus on the knowledge part, such as Murdy, Darling and Gould. Norton seems by his references to aesthetic values and scientific theories to focus just as much on the knowledge part as on the care part of ecological literacy.

Importance of ecological literacy:
I find no special traits with regard to the relative appearance of the knowledge part and the care part of ecological literacy in any of the ethical positions. What I observe and find interesting, however, is that ecological literacy both for the knowledge and the care part seems to gain increased importance for the philosophical theories when universal inner worth is expanded to an increasing range of ecological entities. This observation culminates in a way by my notion that Westra’s holistic ecocentric ethics and Norton’s pragmatic anthropocentric ethics can both be interpreted in a practical context as representing a kind of environmentally strong traditional inter-human ethics where ecological literacy plays a significant role.

If the above reasoning should turn out to have some truth, then it might imply that whatever the philosophical start-point of an environmental ethics might be, whether anthropocentric, biocentric or ecocentric, the differences in practical ethics will be less the more ecological literacy plays a role. In other words, this means that the more people come in contact with, observe and learn about nature, and by that will love, respect and care for a wide range of ecological entities, the less importance the different philosophical theories play for the practical ethics applied. This does not mean that I, like Norton, do not believe in the usefulness or fruitfulness of philosophical theories, such as those within the biocentric and the
ecocentric ethics, which address the questions of universal inner worth of ecological entities. I do strongly believe that such theories have an important function in raising the questions about values behind biodiversity, and forcing the need of awareness about this and to take a stand with regard to the valuations of ecological entities. The attitudes of activists and pragmatic environmentalists, which Norton fully bases his pragmatic anthropocentric ethics on, I only see as one of many parties in participatory processes for handling environmental controversies.

5.6.5 Ecological literacy – particular inner worth

Though the issue of ecological literacy, as mentioned, is too complex to be fully handled within the frames of the present investigation, I am tempted to hold that ecological literacy plays a significant role not only in relation to perceptions about universal inner worth, but also in relation to the perceptions of values behind biodiversity in general. This is in the sense that increased ecological literacy, I believe, makes that the perceptions of values behind biodiversity are getting wider, both with regard to the purely instrumental and the particular inner worth value category. The range of values behind biodiversity, I believe further, will specifically be of the particular inner worth value category if strongly influenced by the love, respect and care part of ecological literacy.

5.6.6 Role of science – create ecological literacy

The above conclusions about ecological literacy support as a whole the role of science in the two-way link between the Cultural Element and the Ecological Element of the Sustainability Context. This is, as mentioned in Chapter 4 (Sustainability Context – contemporary perceptions), an important recognition in relation to the question of value-laden science and the role science may have in creating value attitudes. If it is in fact the case that science can, through ecological literacy, influence value attitudes, including world views and ethics in the field of the environment, this emphasises the responsibility scientists have in separating the knowledge they present from their own value basis. At the same time I think it is important that scientists are aware of and also enforce the role sciences may play in relation to creating ecological literacy as a basis for attitudes, world views and ethics in the field of the environment.
5.6.7 Judgements of ethical records – side comments

Finally are the side comments related to the judgements of ethical records. It is particularly the relevance of the Equity Principle with fair distribution and substitutability that is addressed in some of these side comments. The Harm Principle is mentioned only in connection with Westra’s ethics, and then as a remainder of my choice to use this and the Equity Principle as the framework for the judgements of ethical records in the present investigation.

Also addressed in relation to the judgements of ethical records is the distinction between basic and non-basic or luxury needs and preferences. These are such as when Taylor says that basic interests are essential to the very existence of persons while non-basic interests vary from person to person, and Westra says that non-basic and luxury needs will have lower priority. This is similar to when deep ecology does not support a reduction of richness and diversity of life forms due to humans’ non-basic and luxury needs and preferences. A problem mentioned in deep ecology is that the term “vital needs” is deliberately left vague because the different perceptions of what is absolutely necessary, in regard to both biological and cultural needs, make it problematic to define basic needs.

The most specific example in the side comments of ethical issues related to judgements of ethical records is Regan’s statement that the justifications for hunting and trapping for profit or sport are lame, given the rights view. He condemns sport hunting and trapping, commercial exploitation of wildlife, and domestication of animals in agriculture. This links both to the domestication of salmon and the traditional angling and game fishing of wild salmon, and sets by its critical view and practical focus a tone for the further reflections and discussions in Part III (Case study – salmon farming interests versus environmental interests).
Part III: Case study – *salmon farming interests versus environmental interests*

The case study in Part III is about some controversies between the Norwegian salmon farming industry and environmental interests. It is characterised as a kind of a semi-narrative fiction with a charge against the Norwegian salmon farming industry, an examination, a judgement process with verdicts and some ethical goals.

Chapter 6 (Examination and results – *values behind biodiversity*) presents the charge and examines the various parties’ viewpoints on the accusations in question. The aim of the examination is to reveal perceptions with regard to moral stakeholder status and values behind biodiversity. On the basis of the results from the examination follow the judgements in Chapter 7 (Discussion and conclusions – *ethical records and practical recommendations*). These are judgements of ethical records and verdicts according to the charge. Included here are also suggestions about ethical goals and possible measures for keeping account of progress and achievements in relation to these goals. At the end are the practical recommendations, which I believe represent the most interesting part of the conclusions of the present investigation when viewed from the perspective and interests of the Norwegian salmon farming industry.
6. Examination and results – values behind biodiversity

The five interest groups examined about values behind biodiversity are, as explained in Chapter 3 (Method – a post-normal science approach), the wild salmon group, the environmental group, the animal welfare group, the scientific group and the salmon farming group. The four first interest groups are referred to as the prosecutor groups in the sense that they are accusing the Norwegian salmon farming industry of threatening values behind biodiversity. These are values which the prosecutor groups perceive as important for biological and cultural flourishing. The examination is restricted to values behind four ecological entities, which are wild salmon, their habitats, commercial wild fish stocks and farmed salmon. The intention of the examination is to reveal how the different interest groups value these four ecological entities and in what ways they perceive that the values behind them are threatened.

It should be recalled that the main charge against the salmon farming industry, which the examination builds on, is as follows:

The Norwegian salmon farming industry is charged with violating ethical values by threatening values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon of importance for the flourishing of moral stakeholders. These moral stakeholders are humans, and might also be ecological entities.

In Chapter 3 (Method – a post-normal science approach) it is explained that the ethical values referred to in the charge are related to the Harm Principle, which is about the ethical value of non-malevolence, and the Equity Principle, which is about the ethical value of fairness and justice.

It should further be recalled that the examination form is characterised as semi-narrative because the examination is a kind of narrative with questions and answers, but at the same time not like some free and entertaining fiction. The form is stricter, with specific questions and with answers containing facts and values mentioned in the publications and reports issued by the different groups. On the other hand, it is not as strict and systematic as is normally

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15 It should be recalled that the term “commercial wild fish stocks” includes fish stocks for local small-scale artisanal fisheries in developing countries
expected when presenting empirical data. In short, it could be said that the form of the narrative is akin to fiction, while the content is strictly empirical. The aim is that this semi-narrative form will simulate and demonstrate how a real-life examination of values behind biodiversity might be performed and what kinds of data might be available for the analyses of such values.

The reader should in addition be remained that since the examination is based on written material only, it has not been possible to engage in a dialog and pose control questions to clear up any misunderstandings with regard to the answers. Since I have both selected the relevant answers and interpreted them, the results and conclusions given on the basis of the examinations are thus fully my responsibility. Nonetheless, by using what I found to be the most widely exposed and easiest available publications and reports about the issues addressed in the questions of the examination, I believe that some of the main positions and value perceptions of the five interest groups are picked up.

As described in Chapter 3 (Method – *a post-normal science approach*), I have decided to present the results in the format of the flourishing matrix and in an overview scheme of threats to values behind biodiversity. Statements found in the examination about the values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon are in the flourishing matrix sorted in relation to different value types. Statements about threats are in the overview scheme sorted into three groups. These are threats to the four ecological entities caused by salmon farming activities and agendas, threats that the interest groups emphasise that the Norwegian salmon farming industry should handle, and finally threats to the four ecological entities caused by activities other than salmon farming.

When the results of the examination are presented in one flourishing matrix and one overview scheme of threats for each interest group, these are synopses of what I perceive as the main issues addressed by each group as a whole. This means that at least one representative of the interest group has addressed what I present as the result of the group. The results therefore represent what I perceive as a kind of mutual understanding that the group would agree upon if the examination had been real, and dialog and control questions had been possible.
The examination – *six questions*

Six questions are, as explained in Chapter 3 (Method – *a post-normal science approach*), asked in the examination. The first two questions, as well as the last one, are asked in order to reveal how the groups perceive the values behind the four ecological entities. The other three questions are about threats to these values. In the following rundown each of the six questions are presented with a short description of its purpose.

The first two questions focus on the values behind wild salmon, their habitats and commercial wild fish stock.

To establish which of the three ecological entities (wild salmon, their habitats and commercial wild fish stocks) the interest groups are concerned about with regard to the values behind them, the following question is asked:

1) *What are your primary interests in relation to ecological entities?*

To describe the values behind the three ecological entities as seen from the perspective of the interest groups, the following question is asked:

2) *Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?*

The next three questions are about threats to the values behind all the four ecological entities (wild salmon, their habitats, commercial wild fish stock and farmed salmon).

To reveal possible threats from salmon farming as seen from the perspective of the interest groups, the following question is asked:

3) *What negative impacts do salmon farming-related activities and agendas have on ecological entities?*

To reveal the possibilities of handling the threats as seen from the perspective of the interest groups, the following question is asked:

4) *What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?*
To reveal possible threats from other activities and agendas as seen from the perspective of the interest groups, the following question is asked:

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

The last question focuses on the values behind farmed salmon.

To reveal possible positive values behind farmed salmon as seen from the perspective of the interest groups, the following question is asked:

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

The results – two subsections

The results from the examination are for each of the interest groups presented in two subsections. In the first subsection the results from the answers to question 1, 2 and 6 are presented in a flourishing matrix. The answers to question 1, about the primary interest in relation to ecological entities, are used to reveal which of them the prosecutors groups are specifically concerned about with regard to the values behind such entities. This is in order to determine which ecological entities to note in the heading of the flourishing matrix. In addition, farmed salmon are noted in the headings of all the flourishing matrixes. This is because all the interest groups, due to question 6, have to comment on positive values behind farmed salmon. For the salmon farming group I only denote farmed salmon as the primary interest. The answers to question 2, about why it is important to protect and conserve ecological entities, together with the answers to question 6, about salmon farming, are used to find descriptions of the interest groups’ perceptions about values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon. Sometimes, however, the answers to other questions are also used as a basis for these descriptions.

The second subsection contains the result of the answers to questions 3, 4 and 5, about threats to the values behind biodiversity. These results are, as mentioned, summarised in mind photos showing the overview schemes of the threats, added with comments to each question. This is about both direct and indirect threats to the interest groups’ primary interests with regard to values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon.
This means, as an example, that though the primary interest of the salmon farming group is the values behind farmed salmon, they may have indirect interest in healthy wild salmon habitats since that may represent good environmental conditions for salmon farming.

The interest groups – *wild salmon, environmental, animal welfare, scientific, salmon farming*

The first interest group, referred to as the “wild salmon group”, consists of the Norwegian Wild Salmon Committee, the North Atlantic Salmon Conservation Organization (NASCO), The Norwegian Association of Hunters and Anglers (NJFF)\(^{16}\) and The Norwegian Mountain Touring Association (DNT)\(^{17}\). The Norwegian Wild Salmon Committee, which was appointed by Royal Decree of July 18\(^{th}\) 1997 and delivered its report March 12\(^{th}\) 1999, will when examined be referred to as the Committee. The Committee’s report is relatively extensive and dominates therefore in the answers given by the wild salmon group. NJFF was one of the fourteen members of the Committee. The Committee, NASCO and NJFF have all special interests in wild salmon, while DNT is more focused on the outdoors in general. DNT is selected to be part of the wild salmon group because I believe that general outdoor interests have relevance for the wild salmon interests. DNT thus gives some input to the valuation of nature from the more general perspective of the outdoors.

The second interest group, referred to as “the environmental group”, consists of WWF (World Wildlife Fund), Friends of the Earth\(^{18}\) (The Norwegian Society for the Conservation of Nature), Bellona and FIVH\(^{19}\) (The Future in Our Hands). While the first two environmental groups are parts of international organisations or networks, Bellona and FIVH are national Norwegian organisations. WWF, Bellona and FIVH have all issued reports specifically on wild salmon and salmon farming. This entails that the combined examination of the environmental group covers more pages than the examination of any of the other interest groups.

The third interest group, referred to as “the animal welfare group”, consists of NSPA (Norwegian Society for the Protection of Animals), NOAH (a Norwegian animal welfare organisation) and Debio. Debio is a private, non-profit association based on membership,

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\(^{16}\) In Norwegian: Norges Jeger- og Fiskerforbund.
\(^{17}\) In Norwegian: Den Norske Turistforening.
\(^{18}\) In Norwegian: Norges Naturvernforbund.
\(^{19}\) In Norwegian: Fremtiden i våre hender.
which administers a certification and labelling scheme for biodynamic agriculture. They have developed joint standards for the organic farming of salmonids, perch and cod, in cooperation with the Swedish inspection body KRAV and other European inspection bodies.

Representing the fourth interest group, referred to as “the scientific group”, is the article “Effects of aquaculture on world fish supplies” (Naylor et al. 2000) supplemented with one reference to Pauly et al. (2002).

The fifth interest group, referred to as “the salmon farming group”, consists of FHL\(^{20}\) (The Norwegian Seafood Federation) and some other supporters of salmon farming.

### 6.1 The wild salmon group – the Wild Salmon Committee, NASCO, NJFF, DNT

The examination of the Wild Salmon Committee comes first because they provide the most comprehensive answers. Since all the answers of the Wild Salmon Committee are references from their report *Til laks åt alle kan ingen gjera?* (NOU 1999), only page numbers are given. This report is a review of the overall situation of the wild salmon stocks and proposals for management strategies and action programmes. Then follow the answers of NASCO, and lastly together the answers of NJFF and DNT.

#### 6.1.1 The Wild Salmon Committee – questions 1 to 6

1) *What are your primary interests in relation to ecological entities?*

The Committee’s terms of reference are to ‘review the overall situation of the wild salmon stocks and present proposals for management strategies and action programmes. Issues associated with the regulation of fishing, watercourse management and salmon farming [shall] be given particular attention’ (p.27).

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\(^{20}\) In Norwegian: Fiskeri- og Havbruksnæringens Landsforening.
2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

Some of the reasons are that salmon is a tasty fish and a beautiful animal with a fascinating biology. It has also been an important food source. In the period before the mid-19th century, salmon was an important element of the subsistence economy, and cottars and servants had agreements of not being served salmon more than three times a week in the fishing seasons (p.48).

‘The wild salmon’s value for humans, both the visible commercial values and the symbolic and cultural values in the past and present, are worth protecting and developing as a resource’ (p.48 translated). ‘Besides being a symbol of Norway’s identity and enjoyment of the outdoors, the wild salmon represents a large number of jobs and considerable revenues’ (p.28). Further, ‘[w]ith around 650 salmon rivers and a number of large-grown salmon stocks, Norway is a key nation with respect to wild Atlantic salmon. Our country has therefore an international responsibility to protect the salmon and Norway has also ratified a number of binding international conventions to this end’ (p.28). The three most important are the Rio Convention of 1992, the Bern Convention of 1979 and the NASCO Convention of 1983. The biodiversity part of the Rio Convention is about conservation of all varieties of living organisms. The Bern Convention is about protection of European plants, animals and their habitats, while the NASCO Convention is a commitment to protect, restore and strengthen the North Atlantic salmon stock and contribute to a rational management of the species (p.38-39).

In addition the Committee mentions §110b of the Norwegian Constitution, which says:

Everyone has rights to an environment that secures health and to a nature where the productivity and diversity are conserved. Natural resources should be managed in a long-term and variable way that takes care of the rights of the next generation as well. (p.39 translated)

On the basis of the different points mentioned above, ‘the protection of the salmon can be regarded as a touchstone of our ability and will to protect biodiversity’ (p.115 translated). ‘Due to the significant value wild salmon represents and the international agreements ratified, Norway has a political and moral duty to try to stop and reverse the negative development trend for wild salmon’ (p.116 translated).
Regarding jobs and revenues, ‘it is difficult to estimate the socio-economic value connected with wild salmon’ (p.56 translated). The situation today is that ‘[a]ngling now accounts for the majority of the actual value added’ (p.28). This refers specifically to rental revenue from leasing out fishing rights in the rivers (p.54). There are in addition a number of other activities and agendas connected to this (p.59). Most visible among these is the local economical effects of salmon watercourse-related tourism. ‘In the salmon districts the fishing season is a kind of annual climax. The population in many of these districts can be more than doubled during these intense weeks and people with salmon interests gather from different countries and a variety of social backgrounds’ (p.59 translated). Together all the wild salmon-related activities contribute annually with a turnover of minimum 400 – 500 million NOK or at least 600 man-years\(^{21}\) (p.56). In comparison, the annual market value of the catches of wild salmon whole fish is totally about 20 million NOK (p.54). ‘The total worth of the wild salmon resources, however, in many ways goes far beyond the “accounting figures” of salmon fisheries and tourism’ (p.56 translated).

In recent years the wild salmon has become a new kind of tourist attraction. These are things like salmon observation sites and centres where the visitors can both enjoy nature and learn about salmon and traditional culture connected with salmon. These commercial ways of using wild salmon as an attraction gives new groups of people a chance to experience the salmon and learn about the species and the environment it is dependent on (p.53). It contributes to increased insight into issues related to ecology and environmental protection. Knowledge about the salmon’s biology, their habitats, conservation and fishing methods is in this way kept alive (p.59). At the same time this creates new possibilities for income and employment in the salmon districts. This is a good starting point for strengthening the efforts to save the salmon (p.53).

The considerable socio-economic value of wild salmon together with the species’ special biology has influenced art expressions as well as spiritual and religious customs (p.57). ‘The salmon is central to Norwegian, Sami and Kven (descendants of Finns living in Northern Norway) culture and settlement. The salmon is also visible in Norway’s cultural history, where it figures in various forms of expression ranging from rock carvings, folk tales and

\(^{21}\) These estimates from 1999 are increased to an annual turnover of 1.3 billion NOK and 2,900 man-years in estimates from 2006 (Norske lakseelver 2006).
legends to paintings, handicrafts and language’ (p.28). Salmon has a fascinating life cycle (p.41) and humans have always been interested in salmon (p.48). ‘In the salmon districts the salmon is a vital part of life and the change of season has a major impact on people’s health and enjoyment and quality of life. The salmon is an important resource in Sami […] culture. Salmon fishing is [also] a fine way to enjoy nature’ (p.28-29).

‘Through the Convention concerning Indigenous and Tribal Peoples (ILO) [22], and the Rio Convention, Norway is committed to giving special attention to the culture and lifestyle of indigenous people and to care for their traditional way of living’ (p.117 translated). Conservation of wild salmon is important in this connection, since ‘loss of the salmon resource and the possibilities for fishing salmon will have a serious negative impact on the Sami culture’ (p.58 translated).

‘Viable salmon stocks need to be developed to secure a long-term conservation of the species and its diversity. Then the surplus yield can be harvested to the benefit of society’ (p.116 translated). ‘Salmon catches in Norway have fallen from around 2,000 tonnes in 1980 to 630 tonnes in 1997’ [23] (p.29). ‘There should be no doubt that there is a considerable potential for increased yields from salmon fisheries if the stocks are recovered. The Rio Convention underlines that those who utilise a biological resource also ought to join the convention and carry the burden of conserving and strengthening the resource’ (p.116 translated).

‘The wild salmon stocks are [also] important genetic resources for the [salmon farming] industry’ (p.138 translated).

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

‘[T]he escape of farmed salmon and outbreaks of salmon lice [are] the most serious environmental problems of the [salmon] farming industry in relation to wild salmon’ (p.34). In addition are problems like area use in the coastal zone, waste and residuals, medicine use, chemicals and the spread of fish diseases (p.51).

22 International Labour Organization
23 Salmon catches in 2005 were around 900 tonnes.
The basic reason why the escape of farmed salmon represents a threat is that the production of farmed salmon in Norway is in the scale of 3-500 times that of the wild salmon catches (p.29, 73). ‘[S]everal hundred thousand farmed salmon escape annually and mix with the wild salmon in sea, along the coast and in rivers.’ The result of this is that ‘[t]hrity to fifty per cent of the coastal catch may be farmed fish. The percentage of farmed salmon varies on the spawning grounds in the rivers and is up to 70-90 per cent in some watercourses. The sum of small and major escapes gives rise to a serious genetic interaction between farmed and wild salmon. This will change and weaken the natural stock structure of the species, causing a loss of genetic diversity, which in the longer term could lead to lower survival rates’ (p.29-30).

‘It is documented that escaped salmon are able to breed in nature and have progeny. The spawning success is, however, less than for wild salmon. […] The gene flow from farmed salmon to the wild stocks is calculated for most stocks to be between 0 and 30 %. Many important salmon stocks are today exposed to a gene flow much higher than the natural gene flow, which is calculated to be between 2 and 7 %. The genetic effect from escaped salmon will especially be serious due to continuous and one-way impact from farmed salmon to wild. This impact has increased since the salmon farming industry is growing and the wild stocks simultaneously are extraordinarily low’ (p.75 translated).

‘In addition to the loss of genetic and biological diversity, escaped farmed salmon might have the following negative ecological effects:

- Loss of locally inherited adaptation that can give increased mortality and reduced productivity.
- Digging up the nests of the wild salmon since the farmed salmon spawn later than the wild.
- Inter-breeding with trout.
- Competition between the juveniles of wild and farmed salmon’ (p.76 translated).

The utility value of wild salmon stocks, as important genetic resources for the salmon farming industry, is threatened by salmon escapes (p.138).

When it comes to salmon lice the Committee believes that ‘[t]hough no complete documentation exists, the knowledge available is so worrying that salmon lice should be considered as a significant cause of mortality in migrating smolt’ (p.70 translated). This is because the salmon louse, due to the growth of aquaculture, has hosts in coastal waters year-
round. The incidence of lice infestations has therefore increased in areas with considerable salmon farming (p.29). ‘In earlier years the coast of South and Middle Norway was almost free from salmon lice in the winter season. The winter worked therefore as a bottleneck for the recruitment of salmon lice, because the potential hosts to a great extent were in the watercourses or far out in the ocean. [...] Decisive for the danger of lice infestation on migrating smolt is the production of salmon lice in the farmed populations just before the smolt leaves the rivers, and how the lice are spread by the coastal current northbound in spring and early summer. The salmon lice biology, climate, coastal currents and the time when smolt enters the sea all show that the potential for increased infestation intensity is considerable. In many places along the coast there is a considerable number of escaped salmon in the winter season. This probably increases the danger of lice infestation even further [...]’ (p.70 translated).

‘[S]almon lice together with the virus disease IPN [Infectious Pancreatic Necrosis] count today as the main health problems in the [salmon farming] industry’ (p.69-70 translated). Except for salmon lice and IPN ‘[t]he danger of infection from bacterial and viral diseases in fish farming is currently not regarded as a major threat to wild salmon [...] Infections that have a minor impact in nature might get extraordinarily good growth conditions on farming sites and become a serious problem for farmed organisms, the neighbouring environment and the wild stocks’ (p.68 translated). ‘Diseases might be spread to watercourses by infected wild salmon, by escaped salmon or by passive dispersion in the water’ (p.68 translated). It is, however, still unclear what consequences that diseases and epidemics might have on ecosystems and wild salmon stocks (p.69).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

‘The Committee’s strategy for reducing the problem of escaped salmon is twofold. Firstly, the Committee proposes via the establishment of national salmon fjords that fish farming be increasingly located outside important wild salmon areas. [...] Secondly, comprehensive measures to reduce escapes of salmon from fish farms must be initiated’ (p.34). ‘The Committee believes it is realistic for the Norwegian stock complex of salmon to recover much of its former vigour. [...] [T]he Committee proposes providing stronger protection to a certain number of our most important salmon watercourses and appurtenant migratory areas in fjords and along the coast. [...] In the sea the protection must be directed at salmon farming
operations. [...] A system of national salmon watercourses and national salmon fjords will help protect and strengthen the largest and healthiest salmon stocks. [...] In essence, this entails a prohibition of further intervention and watercourse regulation in the national salmon watercourses and a ban on salmon farming in the national salmon fjords. [...] The majority [of the Committee members] proposed that 50 specific watercourses and nine fjords or coastal stretches be incorporated in the scheme’24 (p.32).

‘The Committee views salmon lice as an extremely serious cause of loss in migrating smolt, and recommends greater concentration on combating salmon lice. Support for concurrent regional delousing programmes must be bolstered and the marginal value for delousing in the winter and spring must be lowered so the farms do not have sexually mature lice on the fish during this period’ (p.35). Regarding diseases in general, ‘the challenge in the future is to maintain the currently good health condition in salmon farming and to avoid the introduction of new diseases that may entail serious consequences for the salmon’ (p.69 translated). Focused research and development have contributed to solving many environmental problems, like the considerable reduction in the use of antibiotics (p.51).

‘The critical situation for the wild salmon and the uncertainty about causal factors and effect of measures indicate a need for stepping up research. [...] [G]reater knowledge is a necessary prerequisite for solving many of the problems affecting salmon. Research must have both a short-term perspective relating to the current threats to wild salmon, and a long-term perspective for increasing knowledge and expertise about salmon’ (p.33). ‘Due to the complex life history of salmon and the many interests linked to the species, scientific knowledge is required to be able to achieve effective management of the species’ (p.39 translated).

As a final comment to question 4, it should be mentioned that ‘the domestication of salmon introduces animal welfare ethics into the field of salmon management. Ethical questions related to the domestication of wild animal species and the husbandry conditions for a species in captivity will be increasingly important’ (p.58 translated).

24 Part of this was approved by the Norwegian Government in 2003. A proposal for supplements and amendments, with additional national salmon rivers and national salmon fjords was presented by the Government 15.12.2006 for handling in the Parliament. As a result, 46 of the 50 watercourses proposed will be protected areas (Proposition to the Storting, 2006).
5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

‘The occurrence of salmon in the North Atlantic varies in long and short cycles. Changes in natural conditions were previously the only reason for the fluctuations […]’ (p.29). Since industrialisation started in Europe, the influence of human intervention and pollution has grown. The four main sources to pollution have been industry, mining, agriculture and human sewage. Much of these problems have been significantly reduced in recent years, although local problems relating to agriculture and special discharge from industry remain. Other sources for the decline in salmon stocks have been attributed to such as overfishing, acid rain, the parasite *Gyrodactylus salaris*, and intervention of watercourses caused by such as hydro power and graveling (p.29, 64-66).

‘Fishing was for long the major mortality factor for migrating spawning salmon. The salmon has been harvested for thousands of years and history shows that it is possible to harvest salmon in a sustainable way’ (p.76 translated). Higher mortality in the seawater phase has over the last 20 years resulted in a decline in the percentage of salmon smolt that migrate from streams and rivers and return from their feeding areas in the sea. The major causes, in addition to increased salmon lice infection, appear to be changes in environmental conditions in the sea. There is also concern about the effect of by-catches and continued growth in stocks of seal and cormorant (p.30).

‘Salmon in Southern Norway began to be adversely affected by acid rain as early as the [19th] century and salmon stocks in 18 watercourses in Southern Norway have been wiped out. The supply of acid through precipitation in Norway has been reduced in recent years, but it will take a long time before the natural conditions are viable for support[ing] salmon’ (p.29). Regarding the intervention of watercourses the situation is that ‘[a] third of the Norwegian salmon watercourses are affected by hydropower regulations, including most of the major watercourses with the largest stocks […]. Watercourse regulation has been cited as a major reason why the salmon is wiped out, threatened or vulnerable in 43 watercourses (p.29). The problem with other physical intervention in watercourses such as channelling, dredging, filling in and gravel excavation is probably underestimated because the individual interventions are minor and they interact with other loss factors (p.29). ‘The occurrence of the salmon parasite *Gyrodactylus salaris* was demonstrated in Norway in 1975 following imports
of smolt from Sweden. The parasite has been registered in 40 watercourses and 37 fish farms in Norway and has affected several of the country’s most important salmon stocks’ (p.30).

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

The salmon farming industry is ‘a major employer and creator of value along the coast and is one of the country’s largest export industries’ (p.28). ‘This industry represents one of the best examples of the great potentials that biological diversity represents with regard to value creation’ (p.50 translated).

6.1.2 NASCO – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

NASCO’s main concern is ‘to promote the conservation, restoration, enhancement and rational management of salmon stocks’ (NASCO 2006 p.1).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

NASCO is ‘conscious of the threats to the wild stocks of salmon from different human activities, including possible adverse effects from salmon aquaculture’ (NASCO 2006 p.1). One ‘overall objective is to maintain and, where possible, increase the current productive capacity of Atlantic salmon habitat’ (NASCO 2001 p.1).

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

In short this concerns genetic and other biological interactions and the risk of diseases and parasites transmission to wild salmon stocks (NASCO 2006 p.2).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

NASCO (2006 p.2-3) recommends to ‘minimise escapes of farmed salmon to a level that is as close as practicable to zero’. In addition it is recommended that measures should be taken to ‘minimise the risk of disease and parasite transmission between all aquaculture activities […]

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and wild salmon stocks’. It is also emphasised that ‘the use of transgenic salmonids should be considered a high-risk activity’.

‘Each Party should encourage research and data collection in support of [minimising impacts from aquaculture], and should take steps to improve the effectiveness of measures […]’ (ibid. p.4). The measures are related generally to sites, operations, diseases, parasites and gene banks (ibid. p.7-9). Special measures are made to prevent escapes of farmed salmon. Beside operations, these measures are about site selection and equipment. ‘Nets, cages and mooring systems shall be designed, constructed and deployed to prevent escapes, having proper regard to the prevailing conditions at the site’ (ibid. p.11). Using local stocks when developing domesticated salmon broodstocks is recommended (ibid. p.34). If farmed salmon have escaped, ‘[e]fforts shall be made to recapture [the escapes] immediately provided that this is practicable and does not adversely affect the Atlantic salmon populations’ (ibid. p.13). Measures related to siting and operations are such as the removal of dead fish, separation of aquaculture facilities, falling regimes and not to exceed density levels based on science and good husbandry practices, in addition to the establishment of ‘wild salmon protection areas’ and ‘aquaculture regions’ (ibid. p.7). All steps to control and prevent diseases and parasites ‘should be conducted in accordance with appropriate fish health protection practices. […] These might include vaccination, use of optimal stocking densities, careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessary disturbance of the fish, detailed health inspections, disinfection of transportation equipment and the use of foot baths at production facilities’ (ibid. p.8).

Recommended measures or issues for research and development and data collection are:

- use of sterile fish for farming
- tagging and marking of farmed fish
- evaluation of production methods
- broodstock selection methodology
- genetics
- diseases and parasites
- better understanding of the interaction between reared and wild salmon
- risk assessment frameworks
- biological interactions between reared and wild salmon
• escape prevention (ibid. p.27-28).

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

NASCO (2006 p.1) is, as mentioned, ‘conscious of the threats to the wild stocks of salmon from different human activities’, and that this ‘[includes] possible adverse effects from salmon aquaculture’.

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

NASCO (2006 p.1) ‘[recognises] the benefits, including the socio-economic benefits, which have resulted from the development of salmon aquaculture’.

6.1.3 NJFF and DNT – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

‘NJFF works continually to […] secure and maintain viable game and fish stocks in order to ensure hunting and fishing in the future[...] [...] to ensure that all motivated hunters and anglers can gain access at a reasonable price [...] [and to] promote hunting and fishing as legitimate forms for harvesting natural resources now and in the future’ (NJFF 2004a). NJFF (2003a) is further grounded on the idea of respect for all living organisms and an understanding of the interrelationship between the varieties of entities in nature. In addition, NJFF (2003b p.3 translated) vows to ‘join in the efforts to secure a sustainable management of Norway’s nature, which includes harvesting of wildlife and fisheries resources based on available facts, local knowledge and traditions’. NJFF (ibid. p.4) is especially concerned with securing the common property rights.

The main mission of DNT is to work for a simple, active, diverse and environmentally friendly outdoor life, and to secure the natural and cultural bases for outdoor life. It should further be emphasised that DNT works to secure and protect outdoor and nature areas as well as support other nature and environmental conservation initiatives of importance for outdoor life. Some of DNT’s main goals are to ensure enjoyable nature experiences and encourage a positive relation to nature, to secure the long-term possibility of enjoying nature, and to conserve remaining valuable natural and cultural landscapes. To the last goal belong
conservation and protection of wilderness areas, biological diversity and endangered species (DNT 2005 p.3-8).

In the following, DNT has only comments to question 2.

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?
The basic premises for NJFF’s (2003b p.2-6) activities are nature-based goods and access to hunting and fishing. This is why NJFF is engaged in natural resource management and different political questions regarding hunting and fisheries. With special relevance for the salmon interests it should be mentioned that the harvesting motive should be the primary reason for all fisheries, but that catch and release is fully ethically justifiable if used as a management measure (NJFF 2003c).

DNT (2007 p.8) focus specifically on enjoying the outdoors and that they for 135 years have ‘shown the way to the most magnificent experiences of Norwegian scenery’ by operating cabins so hikers can ‘safely enjoy the wonderful scenery’.

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?
NJFF (2004b) refers in this connection to the Wild Salmon Committee, in which they participated, and mention especially the salmon lice and escape problems.

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?
NJFF (2004b) see the recommendations given by the Wild Salmon Committee as minimum solutions and perceive every compromise to this as unacceptable.

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?
NJFF refers also in this connection to the Wild Salmon Committee.
6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

NJFF has no specific comments to this other than those given through their participation in the Wild Salmon Committee.

### 6.1.4 Results from the examination of the wild salmon group – values and threats

The results from the examination are, as mentioned, presented in two subsections. In the first subsection the results from the answers to questions 1, 2 and 6 are presented in a flourishing matrix, while the second subsection contains the result of the answers to questions 3, 4 and 5, about threats to the values behind biodiversity.

**The wild salmon group – flourishing matrix**

For the wild salmon group it is reasonable to say that their primary interest is in values behind wild salmon and their habitats, as shown in mind photo 6.1. This should be relatively clear for the Wild Salmon Committee and NASCO, since they refer to the overall situation of the wild salmon and to salmon stocks in their answers to question 1. Also within the broader wild life and outdoor scope of NJFF and DNT, it is reasonable to say that they are interested in wild salmon and their habitats, since they are referring respectively to viable game and fish stocks, and to valuable natural and cultural landscapes in general.

The rationales behind the selected descriptions of values behind biodiversity as they appear in the flourishing matrix of the wild salmon group are explained in the following. These descriptions are primarily based on the answers to question 2, though sometimes answers to other questions are also used as a basis for these descriptions.
Mind photo 6.1 Flourishing matrix – *wild salmon group*

<table>
<thead>
<tr>
<th>Values behind biodiversity</th>
<th>Types</th>
<th>Descriptions</th>
<th>Ecological entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life domain</td>
<td>Life values</td>
<td>(Respect)</td>
<td>Wild salmon</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(Animal welfare)</em></td>
<td>Farmed salmon</td>
</tr>
<tr>
<td>Biological domain</td>
<td>Necessary life support food sources</td>
<td>Food source for Sami and Kven people</td>
<td>Wild salmon</td>
</tr>
<tr>
<td>Cultural domain</td>
<td>Purely instrumental economic values</td>
<td>Tourism, leasing out fishing rights, genetic source for salmon farming</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Employment and income</em></td>
<td>Farmed salmon</td>
</tr>
<tr>
<td></td>
<td>Recreational values</td>
<td>Salmon game fishing, catch and release, adventure, enjoyment of the outdoors, culinary delicacy</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Aesthetic values</td>
<td>Fascination and inspiration, natural and cultural landscapes</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Scientific values</td>
<td>Ecological awareness</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Evolutionary values</td>
<td>Future generations</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Symbolic values</td>
<td>Cultural identity</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Religious values</td>
<td>Spiritual inspiration</td>
<td>Wild salmon and their habitats</td>
</tr>
</tbody>
</table>

**Life domain – *life values***

Starting with the life domain, nothing was said clearly and explicitly about the life value of wild salmon and their habitats. One indication was given by NJFF when they in the answer to question 1 say that the organisation is grounded on the idea of respect for all living organisms. Some indications of life values behind farmed salmon are, given in connection with question 4. These are the references to animal welfare ethics, good husbandry conditions and practices, and density levels in farms. I have therefore suggested the terms “respect” and “animal welfare” as possible descriptions of the life value behind wild and farmed salmon respectively. They are noted in brackets because of the vague indication of life values. Any indications of possible value-conferring properties for ascribing direct moral status values to wild or farmed salmon are not given.

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25 Wild salmon and their habitats and the values behind them are written in normal characters. *Farmed salmon and the values behind them are written in italics.* The same is done in all the flourishing matrixes of the present chapter.
Biological domain – *necessary life support food sources*

Continuing with the biological domain, not much is expressed explicitly either about the value behind wild salmon and their habitats as necessary life support food sources. Though wild salmon in the period before the mid-19th century was, as mentioned, an important element of the subsistence economy, the role of wild salmon as a necessary life support food source is more questionable for most people in Norway today. In any case the annual wild salmon catches in the order of 1,000 tonnes would not be enough to represent a considerable life support food source for Norway’s 4.5 million inhabitants. Some indications of the necessity of wild salmon as a food source were given, however, with reference to Sami and Kven settlements, to the importance of fishing salmon for the Sami culture, to the lifestyle of indigenous people in general and to the commitment to care for their traditional way of living. On this basis I have suggested, though there might be some uncertainty regarding its importance, to use “food source for Sami and Kven people” as a description of a life support value behind wild salmon.

Cultural domain – *purely instrumental economic values and particular inner worth*

Compared to the life and biological domains, there are more references in the answers given by the wild salmon group that point to descriptions of the values behind wild salmon and their habitats within the cultural domain.

Purely instrumental economic value type:

References to the potential for increased yields, the productive capacity of Atlantic salmon habitat, rental revenue from leasing out fishing rights in the rivers, angling and associated activities, tourism, the annual climax, and jobs and revenues in general, are all expressions that variously describe purely instrumental economic values behind wild salmon and their habitats. The annual turnover from wild salmon-related activities is in this connection estimated in 1999 to be 400 – 500 million NOK or 600 man-years. In the flourishing matrix I have therefore suggested to describe the purely instrumental economic values by the terms “tourism” and “leasing out fishing rights”.

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26 As mentioned, estimated to 1.3 billion NOK and 2,900 man-years in 2006.
The purely instrumental economic value behind wild salmon as a “genetic source for salmon farming” is perceived as important by the wild salmon group, and therefore added to the flourishing matrix.

Recreational value type:
Expressions of the recreational values behind biodiversity are such as enjoyment of the outdoors, fishing, catch and release, the annual climax, health and quality of life, and tasty fish. The annual climax was also mentioned in the economic context, but is here referred to in the more social and adventurous sense. On this basis I suggest the terms “salmon game fishing”, “catch and release”, “adventure”, “enjoyment of the outdoors” and “culinary delicacy” as descriptions of the recreational values behind the wild salmon.

Aesthetic value type:
The statement that the salmon’s socio-economic value has, together with its special biology, influenced art expressions should certainly sort under the aesthetic value type. The notion that salmon is a beautiful animal also fits in here. Linked to this are the references to the wild salmon’s fascinating biology and life cycle. Since DNT refers to valuable natural and cultural landscapes, to the great outdoors and to magnificent experiences of Norwegian scenery, and since I have observed that a number of salmon rivers traverse such landscapes, I find it reasonable to also link this to the aesthetic value type. I have therefore suggested “fascination and inspiration” together with “natural and cultural landscapes” as descriptions of the aesthetic values behind the wild salmon’s habitats.

Scientific value type:
Next are the scientific values behind biodiversity, which are more difficult to describe because science is mentioned mostly as a means to problem solving. An example of this is when the Wild Salmon Committee says that due to the complex life history of salmon and the many interests linked to the species, scientific knowledge is required to be able to achieve effective management of the species. NASCO says similarly that research and development should be applied to find how negative effects on wild salmon can be minimised, and to better understand the interaction between farmed and wild salmon. They both refer primarily to problem solving in relation to securing the different values behind the wild salmon and their habitats, where science has the role as a means rather than to be such a value in itself. The reference to new tourist attractions, where wild salmon are used to give new groups of people
a chance to learn about the salmon species and the environment, could, however, be seen as
scientific values behind wild salmon. The notion that this might increase insight into
ecological and conservation issues adds to the relevance of linking this to the scientific value
type. In the flourishing matrix I have therefore suggested that the scientific values behind wild
salmon and their habitats should be described as “ecological awareness”.

Evolutionary value type:
The expressions about Norway as a key nation with respect to wild salmon, and about wild
salmon protection as a touchstone of our ability and will to protect biodiversity, are both
found to relate to the evolutionary value type. Similar to this is the political and moral duty
arising from ratified international agreements. Linked to this is also the objective to maintain
and, where possible, increase the current productive capacity of the Atlantic salmon habitat.
Then, finally, with the reference to the Norwegian Constitution, saying that natural resources
should be managed in a long-term and variable way that take care of the rights of the next
generation as well, I have suggested the term “future generations” to describe these kind of
values behind wild salmon and their habitats related to the evolutionary value type.

Symbolic and religious value types:
Then, lastly, are the descriptions of the symbolic and religious values behind biodiversity. It is
stated that wild salmon is a symbol of Norway’s identity, and that it is central in Norwegian,
Sami and Kven culture and settlement. With regard to the religious aspect it is stated that the
salmon’s special biology has influenced spiritual and religious customs. By this I have
suggested the symbolic value type to be described by the term “cultural identity” and the
religious by “spiritual inspiration”.

Positive effects of farmed salmon – question 6
The answers given to question 6, about the positive effects of salmon farming, is that such
farming provides socio-economic benefits as a major employer and creator of value along the
coast. It is also stated that the salmon farming industry represents one of the best examples of
the great potentials that biological diversity represents with regard to value creation. I have
therefore added “employment and income” as purely instrumental economic values behind
farmed salmon in the flourishing matrix.
The wild salmon group – threats to values behind biodiversity

Mind photo 6.2 shows the threats overview scheme with a summary of the main issues addressed in the answers to questions 3, 4 and 5. These concern, respectively, threats to the values behind biodiversity caused by salmon farming activities and agendas, threats that should be handled and given priority by the salmon farming industry, and threats caused by other kinds of activities and agendas.

Mind photo 6.2  Overview of threats to values behind biodiversity – wild salmon group

<table>
<thead>
<tr>
<th>- threats to values behind biodiversity from the perspective of the wild salmon group</th>
<th>- threats to the possible practical handling of ethical duties the salmon farming industry might have in relation to values behind biodiversity</th>
<th>- threats out of the control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
<td>Threats currently caused by other activities and agendas (question 5)</td>
</tr>
<tr>
<td>Escapes, incl. genetic and biological interactions</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon lice</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Fish diseases</td>
<td>(X)</td>
<td>X</td>
</tr>
<tr>
<td>Pollution</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Area use</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Handling of farmed salmon</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Salmon overfishing</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Climate change and fossil energy</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

The wild salmon group – column for threats caused by salmon farming

The wild salmon group addresses the escapes of farmed salmon and the outbreaks of salmon lice as the most serious problems. Genetic and biological interactions, ecological effects, increased danger of lice infection and the spread of fish diseases are mentioned as serious negative impacts following from escapes. Salmon lice are considered as a significant cause of mortality in migrating smolt. Genetic interactions with wild salmon are seen as serious since it can weaken wild salmon stock structure and cause a loss of genetic diversity. As mentioned in this connection, the production of farmed salmon in Norway is in the scale of 3-500 times that of the wild salmon catches, and that 30 to 50 % of the coastal catch of salmon may be farmed fish. I have sorted these threats to the values behind wild salmon and their habitats into three
rows under the column about threats caused by salmon farming in mind photo 6.2. These rows are labelled “escapes, incl. genetic and biological interactions” (hereafter: “escapes”), “salmon lice” and “fish diseases”. The mark in the row labelled “fish diseases” is in brackets because, except for infectious pancreatic necrosis (IPN), the danger of infection from bacterial and viral diseases in fish farming is currently not regarded as a major threat to wild salmon. Other issues addressed by the wild salmon group are waste and residuals, and the use of medicines and chemicals, which I have put together in the row labelled “pollution”. Also mentioned is area use, which is especially addressed by the proposed establishment of national salmon fjords in order to increasingly locate fish farming outside important wild salmon areas. This is noted in the fifth row of mind photo 6.2 labelled “area use”. Then, lastly, I have marked a row labelled “handling of farmed salmon”. This is, however, not referred to directly as a threat, but indirectly by the references to animal welfare ethics, and good husbandry conditions and practices. This includes notions such as careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessarily disturbing the fish, and density levels based on good husbandry practices.

The wild salmon group – column for threats that should be handled by the salmon farming industry

An issue that was emphasised, linked to the abovementioned proposed establishment of national salmon fjords, is to avoid threats from salmon farming activities and agendas by establishing protected areas and designating aquaculture regions. This is in mind photo 6.2, in the column about threats that should be handled by the salmon farming industry, associated with the row labelled “area use”. Other issues that should be handled by the Norwegian salmon farming industry are the need for establishing comprehensive measures to reduce escapes of salmon from fish farms, and greater concentration on combating salmon lice. This includes recommendations to use appropriate technology, use local salmon stocks and recapture escaped farmed salmon. Together these issues are associated with the rows labelled “escapes” and “salmon lice”.

Emphasis is also put on measures to control and prevent diseases, as indicated by the mark in the row labelled “fish diseases”. These measures are such as the removal of dead fish, separation of aquaculture sites, year-class separation and fallowing. The challenge of maintaining the currently healthy condition of salmon farming is stressed in this connection. This is done with reference to the considerable reduction in the use of antibiotics as an
encouraging example of how focused research and development have contributed to solving environmental problems.

All the issues mentioned above as indirect notions of threats labelled “handling of farmed salmon” are actually threats that the wild salmon group expects the salmon farming industry to handle, as marked in mind photo 6.2.

The wild salmon group – column for threats currently caused by other activities and agendas

The threats to wild stocks of salmon, which are caused by different human activities and agendas, started, as mentioned, with human intervention and pollution due to the industrialisation in Europe. This partly concerns acid rain, and though the supply of acid through precipitation has been reduced in recent years, it will take a long time before the natural conditions are viable for salmon.

The wild salmon group states that the main threats external to the salmon farming industry are currently posed by the parasite *Gyrodactylus salaris*, hydro power, other interventions of watercourses, overfishing and changes in environmental conditions in the sea. *Gyrodactylus salaris* has affected several of Norway’s most important salmon stocks. Regarding the intervention of watercourses, the situation is that a third of the Norwegian salmon watercourses are affected by hydropower regulations, with watercourse regulation as a major reason why the salmon is wiped out.

Together the abovementioned external threats are in mind photo 6.2 associated with the rows labelled “fish diseases”, “area use”, “salmon overfishing” and “climate change and fossil energy”.

6.2 The environmental group – WWF, Friends of the Earth, Bellona, FIVH

The examination of the environmental group starts with WWF, which is the most internationally oriented environmental group of the four. WWF focused originally on protecting threatened animals, but is now more oriented towards the ecosystem in general. Next is Friends of the Earth, which focuses specifically on national species, nature and
landscapes, but is at the same time part of an international network. Then comes Bellona, a national organisation which focused originally on pollution issues, but now with a wider ecological focus. Lastly is FIVH, whose main focus is on equity and human consumption.

Since WWF, Bellona and FIVH have issued reports specifically on wild salmon and salmon farming, the examination of the environmental group covers, as mentioned, more pages that the examination of the other interest groups.

6.2.1 WWF – questions 1 to 6

1) What are your primary interests in relation to ecological entities?
‘WWF’s mission is to stop the degradation of the planet’s natural environment and to build a future in which humans live in harmony with nature by

- conserving the world’s biological diversity,
- ensuring that the use of renewable natural resources is sustainable, and
- promoting the reduction of pollution and wasteful consumption’ (WWF 2004a).

WWF also works ‘to conserve nature and ecological processes’, something which involves ‘ensuring the sustainable use of renewable resources’ (WWF 2003 p.3).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?
‘The anadromous Atlantic Salmon is among the most revered species on the planet. Its ability to navigate the ocean, to return to its natal stream, to leap over seemingly impassable obstacles, and to detect through its olfactory senses the very gravel of its origin, has amazed and inspired humans for thousands of years’ (WWF 2001a p.1). Through millennia, this amazing animal, which is also referred to as the king of fish and an animal that perfectly embodies the idea of perseverance, has chosen only the most pristine river systems as its habitat. It became the magnificent centrepiece for thriving ecosystems (WWF 2001b). ‘[M]ore recently [the Atlantic salmon] has been ‘likened to a canary in the mine, an early detection system warning us, with its widening demise, that we are threatening the planet and every living thing’ (WWF 2001a p.2).
WWF is concerned about the vulnerability of wild salmon in North America and Europe, and Norway’s responsibility in this connection. 15% of all Atlantic salmon-bearing rivers have lost their salmon population completely. This represents 294 river systems in these areas. 12% of all the rivers have populations that are in a critical condition, 20% that are endangered, and 10% that are vulnerable, whereas 43% of the populations are healthy. In Norway, salmon is extinct in 9% of the rivers, in 8% the situation is critical, in 23% endangered, in 3% vulnerable and in 47% healthy. For 10% of the rivers the status is unknown. Approximately 90% of the Atlantic salmon populations known to be healthy are found only in Norway, Iceland, Scotland and Ireland (WWF 2001a p.6, 125).

Studies have showed that the economic effects of sports fishing had a revenue value ranging from NOK 465 per kilo in 1989 to NOK 2,608 per kilo in 1996 of wild salmon caught in Norwegian rivers. ‘If wild salmon resources in Norway were restored and utilised in a sustainable manner, salmon catches in rivers could easily be around 1,000 to 2,000 tonnes annually. […] Using a midrange estimate of NOK 2000 per kilo, the economic value of wild salmon stocks could thus be at least between NOK 2 – 4 billion […] annually. The value of the wild salmon catch in Norway would then be of the same order of magnitude as the value of salmon farming, which had a 1999 export value of approximately 11 billion NOK’27 (ibid. p.67).

‘[T]he value of salmon farming should be discounted appropriately in order to take into account the environmental costs associated with the industry. […] It should also be noted, that without the wild salmon, there would be no salmon farming industry. […] The genes of wild salmon stocks contain information that the salmon farming industry may need to solve future problems. Therefore, any calculation of the full economic value of wild salmon to any nation in which salmon farming is an important industry, should take into account the contingent value of wild salmon to the salmon farming industry’ (ibid. p.67-68).

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

The farming of aquatic organisms in general can cause detrimental effects on the environment and be socially and economically unsustainable in both the short-term and the long-term. Its

27 The export value in 2005 was 13.5 billion NOK (FHL 2005a, SSB 2006).
consequences have proven disastrous in some areas of the world (WWF 2003 p.3). Environmental problems related to salmon farming are specifically pollution, disease, parasites, escape, fish husbandry and the use of wild fish to produce salmon feed (Porter 2003, WWF 2004b). The pollution problems are primarily linked to the release of nutrients and heavy metals in the costal areas. The release of phosphorus and nitrogen from an average farm producing 500 tonnes of salmon per year is equal to the effluents from a city of 5-7,000 inhabitants. The negative impact of this can be biological changes in the ecosystems, more frequent algae blooms, reduction of oxygen content in the water and that benthos die out (WWF 2004d). The heavy metal problem refers to the release of copper from substances used to avoid fouling on the fish pens. The fish farming industry contributes with 30 % of the total Norwegian discharge of copper to the coastal zone. Though copper to a small extent is assimilated in fish, it can be traced in the bottom sediments, in seaweed and to some extent also in mussels (WWF 2004f).

‘[F]ish farms can act as a source of disease and parasites, and escaping farmed fish threaten the genetic and ecological integrity of wild salmon populations’ (WWF 2001b). There is evidence that such impacts from salmon farming have contributed to drastic declines in wild salmon returns to the rivers of Norway, Scotland and Canada (WWF 2001a p.46).

In 1999 the total production of farmed Atlantic salmon in Europe was 600,000 tonnes, or more than 300 times the wild salmon caught in all the rivers in the North Atlantic Ocean. This means that one tonne of farmed Atlantic salmon was produced for each individual wild salmon caught (ibid. p.45). The production of farmed salmon in Norway in 1997 was more than 500 times greater than the catches of wild salmon. The number of wild salmon spawning in Norwegian rivers has been estimated at 100,000 to 250,000 individuals, while it has been estimated that in 1988-1992 an average of 1.6 million farmed salmon escaped annually. The total number of officially reported escaped farmed salmon in Norway from 1988 to 1999 was approximately 10.6 million. The lot of escaped salmon is also illustrated by figures showing that between 30 and 50 % of the coastal catch of salmon may be farmed fish. The presence of farmed fish as a percentage of the total salmon in rivers varied between 15 and 34 % during the period 1989-1999, and was as high as 70-90 % in some rivers (ibid. p.46-47).

‘The salmon aquaculture industry tends officially to deny that escapes have any negative effect on wild salmon populations. […] However, the scientific literature suggests that
escaped farmed salmon may indeed be causing serious problems for wild Atlantic salmon. Once they enter salmon rivers, farmed progeny compete with wild salmon for access to spawning partners and sites. Successful spawning of farmed Atlantic salmon that had escaped to Norwegian and Scottish rivers has been documented on the basis of observations of distinct pigmentation differences between the eggs of wild and farmed fish. Experiments suggest that the reproductive success of farmed salmon is considerably lower than that of wild salmon, especially for males. In rivers with low density of spawners, escaped farmed females may spawn with as high success as wild females’ (ibid. p.49).

It has further been observed that farmed females often destroy the nests of wild salmon in nature by digging up the eggs of early-spawning fish. ‘Thus even though farmed salmon have low spawning success themselves, they can reduce the success of local wild fish.’ Experiments with progeny of farmed and local wild fish show that the farmed progeny were more aggressive, and more risk prone, than the progeny from wild parents. Observations in the wild have showed that farmed and wild offspring compete for territories and food, and that both farmed progeny and farmed/wild crosses have higher growth rates than native fish. ‘It is likely that competition between farmed and wild fish in rivers results in lower production of native populations.’ Little, if anything, however, ‘is known about interactions between farmed and wild fish in the open ocean’ (ibid. p.49-50).

WWF also addresses genetic effects, in that ‘[i]nterbreeding between farmed and wild Atlantic salmon will result in homogenization of the genetic structure of the species and erosion of genetic adaptations to local environmental conditions. At current levels of invasion by farmed fish of the habitats of wild salmon populations, this may be a rapid process. […] Farmed Atlantic salmon represents a mixture of wild populations that have been selected for adaptation to a captive environment since the early 1970s. It has been shown that farmed salmon now differ genetically from the wild populations from which they were derived.’ A large-scale experiment has shown that the lifetime reproductive success of farmed salmon was only 16 % of that of native wild salmon. With farmed fish representing 55 % of all spawners, experiments have shown that the gene flow causes the genetic difference between farmed and native salmon population to be halved every 3.3 generations. ‘The native population will eventually be composed of individuals that have all descended from the migrants, and this situation is approaching rapidly for selectively neutral traits. […] This genetic impact comes
on top of the potential effects of competition on productivity […] and calls into question the long-term viability of many salmon populations’ (ibid. p.50-51).

Efforts are done in the US to develop a fast growing gene-modified salmon. WWF warns strongly against this because of the risk that escaped gene-modified salmon might cause serious negative impacts on wild salmon stocks (WWF 2004c).

‘One of the ways in which salmon aquaculture causes the reduction and loss of salmon populations is through diseases. In particular, transfer of Atlantic salmon between regions has led to fish populations coming in contact with pathogens and parasites to which they were not adapted. These new host-parasite or host-pathogen confrontations have in some cases led to unnaturally high fish mortality.’ The parasite problem caused by salmon lice has been encountered in aquaculture since the mid-1970s, and has been recognised as a problem on wild sea trout and Atlantic salmon since 1989. Salmon lice have been shown in experimental studies to transfer the infectious virus salmon anaemia (ISA) between fish. ‘Heavily infested sea trout and Atlantic salmon smolts have been exposed to increased seawater mortality. […] To what extent salmon lice are implicated as a cause for the recent unexplained high mortality of Norwegian salmon in the ocean is not yet clear.’ However, it has been recorded that ‘up to 86 per cent of juvenile salmon leaving the rivers are killed by sea lice and never make it into the open ocean’. WWF also refer to observations showing that ‘the worst infections of sea lice on wild salmon are in areas with salmon farming. Because of the large numbers of farmed salmon compared to wild salmon, it is likely that the incidence of salmon lice on farmed fish is much more substantial than the incidence on wild salmon’ (WWF 2001a p.52-53). The amount of sea lice can be 200 times higher than normal in areas with high concentrations of salmon farms (WWF 2004e).

The Norwegian law on aquaculture establishes certain fish husbandry standards, such as maximum stock density and regular fallowing. This law appears, however, to fall short of reflecting the best practices in the industry internationally. ‘It calls for a maximum stock density of 25 kg per cubic meter, which is more than 250 percent greater than the 9 kg per cubic meter actual average stocking density in Scotland, despite the fact that both Scotland and Norway have roughly [similar] low current speed and longer required flushing times in the fjords where most of their salmon farm industry is concentrated.’ The Norwegian law on aquaculture requires regular fallowing, but does not require single year-class stocking at fish
farm sites. The law indicates that the fallowing length depends on relevant guidelines issued by the Norwegian Animal Health Authority. These guidelines regulate fallowing periods in salmon farming to be two months each year. The fallowing practices vary widely from county to county, and in some counties the minimum fallowing period is six months (Porter 2003 p.40).

In addition to the issues of pollution, escape, disease, parasites and fish husbandry, attention should be directed to the use of wild fish for the production of salmon feed. WWF has calculated that 4 kg of wild-caught fish is required to produce 1 kg of farmed salmon. This calculation is based on the estimated average use of fish oil as raw materials for salmon feed (WWF 2003 p.17). ‘All fish species used for fishmeal and fish oil in both the Pacific and the Atlantic are very important for the marine ecosystem as they are prey for fish, birds and mammals,’ WWF explains. ‘Heavy exploitation could lead to serious environmental disturbances’ (ibid. p.41). ‘Increased exploitation of these species to meet the demands from an expanding fish farm industry could very well turn out to be an ecological time bomb under the industry’ (ibid. p.5). ‘[T]his type of aquaculture is on a destructive path that might pose a threat not only to wild fish stocks but also to the industry’s own long-term potential. The demand for high quality seafood is increasing and it will only take a few years for the aquaculture industry to consume all the fish oil produced in the world’ (ibid. p.41). Connected to this is concern that unintended capture and illegal culling of fish, mammals, birds or other animals can exert pressure on species that play no role in aquaculture (ibid. p.11).

‘Since no increase in global production of fishmeal and fish oil is expected, the salmon farming industry is now looking for alternative feed resources.’ Krill is one of these resources. The problem with this is that ‘[l]arge scale harvesting of krill, the most important species in the food web, could have severe knock on effects on the marine ecosystems if sufficient caution is not shown’ (ibid. p.5). One challenge related to the use of vegetable raw materials in fish feed production is that the relevant plant production has direct and indirect impacts on natural habitats of high conservation value and on the livelihoods of people and endangered species that depend on those habitats. Another aspect is the use of gene-modified plant

28 Norwegian Animal Health Authority became from January 1 2004 part of the Norwegian Food Safety Authority.
organisms, which both involves the danger of releasing these organisms into nature and the scepticism among consumers towards such products (ibid. p.37-38).

WWF concludes that ‘[t]oday’s farming of carnivorous species such as salmon and trout is not sustainable, as it consumes four times as much wild-caught fish as it produces farmed fish.’ In addition they claim that ‘[b]y using large amounts of wild-caught fish to feed farmed fish, the European aquaculture industry is actually increasing the pressure on ocean fish populations.’ ‘WWF fears that the growing fish farming industry will contribute to a further pressure on already heavily exploited fish species’ (ibid. p.6).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

Due to fears that the growing fish farming industry will put further pressure on already heavily exploited fish species, WWF does not encourage more farming of carnivorous fish species. WWF further urges the salmon farming industry to make sure it only buys oil and meal from healthy, sustainable and well managed fish stocks (WWF 2003 p.6).

‘Standards for responsible salmon aquaculture should be adopted and adhered to that:
1. Minimize genetic and biological interactions between farmed and wild salmon;
2. Address adverse effects associated with effluent discharges, disease transmission and spread of parasites;
3. Exclude new operations from sites detrimental to wild salmon’ (WWF 2001b).

WWF (2003 p.13) advises the following more specific criteria for sustainable aquaculture:
1. ‘Not operate in marine protected areas and areas where the activity is likely to cause serious or irreversible effect on vulnerable species or habitats, such as the escape and interbreeding or competition of culture species with wild species or races.
2. […]
3. Fish used for fish oil and fishmeal, often small marine pelagic species, should only come from healthy, well-managed and sustainable stocks, preferably independently certified.
4. Extraction of water must not have a harmful effect on humans or natural wildlife that depend on the same water source.
5. Genetically modified fish should not be developed for aquaculture and fish feed
should be guaranteed free of genetically modified plants or animals.
6. Harmful quantities of waste nutrients must not be discharged to freshwater or marine
ecosystems, and best available technology should be employed to ensure resource
efficient farming systems and adequate wastewater treatment.
7. Toxic chemicals, antibiotics or other substances that harm the environment must not
be discharged.
8. There should be no transmission of diseases and parasites to wild species.
9. […]
10. Cease the illegal capture or culling of fish, mammals, birds and other animals that
have interactions with farming systems.
11. The development and spread of the aquaculture industry must be controlled and
sensitive so as to avoid physical damage to coastal ecosystems and structures and
negative impacts on coastal communities’.

In addition, WWF (Porter 2003 p.38-43) advises the salmon farming industry to do the
following:
• Accept the proposed system of 22 national salmon fjords and 39 national salmon rivers,
which involve both areas in which salmon farming would be prohibited, and areas in
which it would be restricted and subject to more rigorous controls.
• Implement an analytical system for calculating the ecosystem carrying capacity for a
given fjord, and agree on statutory requirement to reject applications for farming sites in
areas where carrying capacity is not sufficient.
• Though the Norwegian regulations require that each fish farm license holder operates the
sites for which the license is held in an environmentally acceptable way, it does not
establish a specific standard for environmental quality of the benthic ecosystem beneath
and around the fish farms. Such standards should be established for which fish farms can
be held accountable.
• Design and deployment of obligatory standards for technical equipment used by the
aquaculture industry to optimise containment of fish and minimize escapes.
• Adjust requirements for fish husbandry, such as year-class separation, fallowing of sites
and maximum stocking densities, in accordance with best industry practices,
• Make available more adequate enforcement actions of requirements for monitoring of escape prevention and escape contingency plans.

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

Major threats to wild Atlantic salmon populations, in addition to salmon farming, are ‘overfishing, hydropower dams and other man-made river obstructions, river engineering schemes like for flood defence or navigation, and pollution from industry, urban settlements and agriculture’ (WWF 2001a p.10).

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

‘[…] WWF would like to point out that not all fish farming practices are destructive. In fact, we see evidence of constructive conservation advances in a few North Atlantic aquaculture industries beyond government initiatives’ (WWW 2001a p.5). Referring to WWF’s mission ‘to conserve nature and ecological processes while ensuring the sustainable use of renewable resources […] WWF […] recognises the potential value to society of aquaculture in terms of providing food security, revenue and an alternative food source to wild-caught fish’ (WWF 2003 p.3).

6.2.2 Friends of the Earth – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

Friends of the Earth ‘will strive to protect nature and the environment in such a way that human activity does not exceed the carrying capacity of nature’. Further, Friends of the Earth ‘will work for a society where the people live in harmony with nature. This is a society where the basis and diversity of life is secured for future generations, and where nature's own values are the foundation of the work to increase man's respect for and love of life and landscape’ (FoEN 2003a). The main focus is on biodiversity, sustainable harvest and pollution control. Specific focus is on pristine nature, watercourses, marine resources, the climate and toxic effluents. The biodiversity work is concentrated on protecting and preserving the part of the natural heritage represented by the remaining areas of pristine nature, protecting watercourse against further development of hydropower and securing viable populations of the large predators. The focus on marine resources concerns the sustainable use and management of
fisheries resources and the challenges related to the marine environment, including impacts on fish farming. The climate question is concentrated on reducing climate gas emissions, on both the international and national level. Finally, the focus on toxic effluents is about both cleaning and eliminating toxic substances (FoEN 2004a, FoEN 2006a)

Friends of the Earth has joined the Norwegian Network for Food and Environment. This is a Network of ten NGOs which acts as a spokesman for consumer interests. The focus is on sustainability in food production in the sense that food offered in the marketplace should be of best possible environmental and health quality (Grønn Hverdag 2006). Some of the answers given to questions 2, 3, 4 and 5 are for Friends of the Earth based on references from this Network.

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

Friends of the Earth sees this in the general context of nature conservation. The basis of the work is ‘[t]he enjoyment of nature, the adventurous experiences in nature and the recognition that humans are a part of nature. All living beings, and the richness and diversity of life forms have intrinsic value’ (FoEN 2006a p.1 translated). By intrinsic value is understood that nature should be protected even if it has no direct utility value for humans (FoEN 2006b p.2).

Friends of the Earth believes that ‘living, learning and moving around in a country with a beautiful and rich nature gives a conviction that the basis for the lives of plants, animals and humans needs to be taken care of, both now and for the future, in Norway and globally. […] Development of societies and technology that can destroy nature, and therefore the basis for human life, is thus not seen as progress. Progress can only come if human activities are within the frames of nature’s carrying capacity’ (FoEN 2006a p.1 translated).

With a growing world population, reduced grain stocks and overexploited fish resources, Friends of the Earth pays special attention to the important role wild fish resources might play in food security (FoEN 2003b p.2).

The main challenge in this context is to take care of nature’s diversity, to harvest from nature only resources that are renewable and to release into nature’s food web only substances that can be disintegrated within nature’s carrying capacity (2006a p.2).
3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

The issues addressed in relation to salmon farming are about exploitation of wild fish resources, the world’s food resources, sustainable food production, energy use, food safety, genetically modified organisms, medicine use, effluents, escapes of farmed fish, fish diseases and animal ethics. The seriousness of these issues is seen in light of a growing fish farming industry (FoEN 2002a, FoEN 2003b, FoEN 2006a). Friends of the Earth state specifically that ‘effluents of copper and nutrients, escaped farmed salmon in Norwegian watercourses, transmission of parasites and diseases, and pressure on other fish species to cover the need for fishmeal, are important environmental challenges’ (FoEN 2003b p.1 translated).

Friends of the Earth express serious concern regarding the growth scenarios given for the Norwegian fish farming industry. Norway could end up as a net importer of fish since the increased production of farmed fish will demand about 10 million tonnes of wild fish as raw material for fish feed production. This represents more than one-tenth of the world’s total capture fisheries production. The result would be that ‘the wild fish stocks would be fished down, simultaneously as Norway would use great amounts of the world’s capture fisheries production to feed fish for the world’s most affluent citizens’ (FoEN 2002b p.1, translated).

‘74 % of the world’s fish stocks are either harvested at the maximal level, too heavily exploited or almost extinct. […] These fish stocks play an important role in the marine food web, and too heavy exploitation may cause imbalance in the whole marine ecosystem’ (FoEN 2003b p.2 translated). ‘Fish farming cannot replace the ocean’s natural production of food’ FoEN 2006a p.4 translated). There have been incidences in Chile where Norwegian operators have met protests from local fishermen and environmental movements because fish farms threaten wild fish stocks and the marine environment (FoEN 2003b p.2).

Another element of this is that fish stocks used for fish feed production might play an important role in the food security context if directly used for human consumption. This is mentioned in relation to the growing world population, reduced grain stocks and overexploited fish resources (FoEN 2003b p.2). As an example of how this turns out they mention import of fishmeal and fish oil from Chile and export of farmed fish to India, where the low-priced Norwegian farmed fish out competes local Indian fishermen (FoEN 2002a p.4).
Unacceptable in connection with food safety are gene-modified fish, gene-modified raw materials in fish feed and gene-modified vaccines (FoEN 2003b p.3).

The focus on pollution concerns especially the release of nutrients and heavy metals from fish farming activities. Friends of the Earth mentions that the fish farming industry contributes with 30% of the total Norwegian discharge of the heavy metal copper, which is toxic to aquatic organisms, and that the release of nutrients is equal to the discharge of sewage from a city of 5-7,500 inhabitants. When it comes to the escape problems, they mention the genetic threats to the wild salmon stocks, the danger of disease transmission, as well as the salmon lice problem in areas with high concentrations of fish farms (ibid. p.3-4).

Finally, there is the issue of animal ethics, which is about the well-being of the farmed fish. Things like unnecessary suffering in relation to stock densities, diseases, bad water quality, artificial lightning of the pens, handling and painless slaughtering process are mentioned in this connection (ibid. p.4).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

‘Strong efforts in research and development are necessary to be able to solve the problems fish farming copes with in relation to feed resources, environment and fish health. To maintain the fish farming industry, strong demands and requirements are necessary in food safety, and on responsibility in the production with regard to the environment and to animal welfare’ (FoEN 2003b p.1 translated).

Norwegian fish farming should be responsible for not threatening sustainable coastal fisheries or local workplaces in Norway or abroad (ibid. p.2). ‘When establishing aquaculture activities in other countries, Norwegian farmers should respect local fishing traditions to secure a sustainable development in those countries’ (ibid. p.2 translated). To avoid overexploited fish resources and the use of fish feed raw materials that in future can be of great importance for human consumption, the feed should as much as possible be based on local and renewable resources (ibid. p.2).
In relation to food safety the concern is that consumers should be assured that the fish on offer is healthy food and they should know what they are eating. Friends of the Earth stresses that EU has a zero tolerance for medicine remnants in the fish (ibid. p.2-3).

Based on this, and akin to meat production, salmon farming should ‘not be based on raw materials for fish feed that might be used for human consumption. […] [F]ish farming should operate in ways that do not lead to pollution in local areas, that avoids the escapes of fish and the transmission of diseases and that in general do not disturb the balance in nature’ (FoEN 2006a p.5 translated). In general, Friends of the Earth holds that ‘it is more environmentally friendly to produce food close to where people live, since this reduces transportation and the risk of disease transmission by the food’ (FoEN 2002a p.2 translated). The salmon farming industry is urged to reduce the use of fossil energy caused by long-range transportation of food (ibid. p.4). This means both transportation of fishmeal and fish oil for fish feed production and the transportation out again of the farmed fish to markets worldwide.

In this relation Friends of the Earth states that:

- ‘the differences between poor and rich people need to be reduced nationally and globally.
- the activities of multinational companies should be controlled so that they do not get too much power over societal values.
- local companies and food producers should be secured so that they do not go out of business.
- […]
- the same environmental and social demands should be put on Norwegian companies working abroad as what is demanded in Norway’ (FoEN 2006a p.7 translated).

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

It is not only the fisheries related to raw materials for fish feed production that cause concern. There are also worries about the general overexploitation of wild fish resources, and about too heavy investments in vessels and processing plants, which have forced great parts of the fisheries into a crisis (FoEN 2004b p.1).
In relation to some of the other issues, like the world’s food resources, sustainable food production, GMO, pollution and energy use, there are negative impacts from agriculture. Though these things in many instances do not refer exactly to the same ecological entities as those affected by salmon farming, they refer to problems of a similar character (FoEN 2006a p.4-5). The questionable and very resource-intensive feeding of farmed fish with fish and grain that could be used for human consumption is parallel with the use of feed in production of meat in agriculture (FoEN 2002a p.4, FoEN 2003b p.2).

The pollution problems are also referred to on a more general basis as a problem linked to industry, agriculture, transportations and the general public consumption. The same is the case for Norwegian energy consumption, which should be reduced considerably (FoEN 2006ap.5-6).

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?
Fish farming is one element in the bigger picture of sustainable food production. Fish farming is a new and important industry along the Norwegian coast, and Norway has a clean marine environment with good natural conditions for sustaining an environmentally friendly fish farming industry. A more environmentally friendly fish farming industry will therefore in the long run contribute to stable employment (FoEN 2003b p.1).

6.2.3 Bellona – questions 1 to 6
Since all the answers of Bellona are references from their report *The Environmental Status of Norwegian Aquaculture* (Bellona 2003), only page numbers are given.

1) What are your primary interests in relation to ecological entities?
Bellona has always focused on the marine environment. ‘Pollution of the oceans has always been central, whether our efforts have focused on manufacturing, radioactivity, oil and energy, shipping or fisheries and aquaculture. The struggle for clean oceans is the struggle to preserve nature's diversity for our descendants and produce food to sustain the world's future population. Although the oceans' potential for food production is enormous, it is threatened by radioactive contamination, oil spills, environmental toxins and climate changes. Clean oceans are absolutely essential to marine food production. Bellona intends to fight with all available
resources so that we meet this requirement in the future as well. […] Our ambition is to set the agenda for the political and scientific debate in the area of marine food production’ (p.6).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

‘The recognition of the fact that we humans live from harvesting nature's bounty comes naturally to Norwegians. This recognition is the basis of Bellona’s environmental protection efforts. It is also why Bellona is positive towards aquaculture as an idea. […] We believe that pure and safe food from the ocean will play an ever more important role in the Norwegian economy’ (p.6).

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

Bellona sees ‘that the industry has a considerable environmental impact, in the form of pollution as well as effects on Norway's unique wild salmon stocks’ (p.6).

‘In 2002, over 600,000 escapes from Norwegian fish farms were reported. A considerable percentage of these escapes were due to technical malfunctions and propeller damage. Bellona reports such incidents to the police, since the farms do not meet statutory requirements for proper technical standards and operation. In certain fjord areas and salmon rivers, more than half of the salmon are escaped farmed salmon. If the percentage of escaped farmed salmon in the river is high compared with wild salmon stocks, the farmed fish can affect the wild salmon ecologically and genetically. Salmon lice pose a serious problem to wild salmon. If the salmon lice are not under control in fish farms, the high density in fish farms on the salmon's route from the river to the sea may be a major source of infestation’ (p.10).

The main problems with escaped farmed fish are the following:

- ‘Farmed fish have lower genetic variation than wild fish.
- Farmed fish have altered fitness-related traits that include anatomy, physiology, behaviour and life history.
- Farmed fish hybridise with wild fish.
- Hybrids between wild fish and farmed fish are generally intermediary forms.
- The fitness of wild populations is reduced by immigration of farmed fish.
• For the time being it is difficult to test the consequences of reduced genetic variation in and between wild populations.
• Escaped farmed fish destroy, and compete with wild fish for spawning beds.
• The progeny of escaped farmed fish out-compete wild fish in the competition for resources in the river, both as fry and as parr.
• Farmed salmon increase the hybridisation between salmon and trout
• Coadapted gene complexes are likely to disappear from local salmon populations
• The size and fitness of the populations of Norwegian salmon stocks will be reduced if the percentage of farmed salmon continues to be high’ (p.24-25).

‘Salmon lice continue to represent a significant problem for the stocks of wild salmonids in Norway’s coastal and fjord areas. The number of hosts is steadily rising, and absent a change in current strategies for combating salmon lice, this will lead to ever-increasing production of salmon lice in the years to come. […] We see that escaped salmon contribute heavily to the production of salmon lice along the Norwegian coast’ (p.28). ‘Treatments of lice-infested farmed fish can be divided into three main categories, which are usually used in combination: wrasse, delousing baths, and medicated pellets. The first, wrasse29, has few environmental drawbacks, but certain limitations on practical use. The two others subject the fish and the marine environment to toxic substances, and must therefore be thoroughly evaluated with a view to environmental impacts’ (p.30).

‘Pharmaceuticals used to combat salmon lice in fish farms are potentially harmful to animals and other organisms in the water and on the bottom around the cages being treated’ (p.10). ‘Common to all pharmaceuticals intended to combat salmon lice is that they are toxic to a number of organisms, especially crustaceans, which are the subphylum salmon lice belong to. However, the toxic effects of the substances are relatively local, in the sense that individuals located a distance from the fish farm are not exposed to toxic doses of the agents. How large an area around the fish farm that is affected will vary with the type of substance and local environmental conditions, such as currents and aquatic chemistry. The pharmaceuticals are also relatively persistent, with half-life periods of several months in sediment, though they are biodegradable, unlike heavy metals and other environmental toxins’ (p.38).

29 Wrasse is an umbrella designation of fish in the wrasse family (Labridae) that can feed on ectoparasites, i.e. parasites that are attached to the outsides of farmed fish (Bellona 2003 p.36).
'Previously there was widespread use of antibiotics in Norwegian fish farming, but vaccines, improved tending routines and better locations have reduced this problem to a minimum’ (p.10). ‘[T]he use of antibiotics […] has fallen from 50,000 kilograms to 500-600 kilograms in fifteen years. […] Current levels are low enough not to pose any environmental problem. Nevertheless, there are two reasons why we wish to focus on this issue. First, the use of antibiotics is still high in other countries where salmonids are farmed. This applies to Chile, for example, a country not as advanced in preventive fish health as Norway. […] Second, we fear that consumption in Norway will rise if the farming of other species such as cod reaches significant production volumes. […] Three effects of the spread of antibiotics to the marine environment are highlighted: - Antibiotic resistance - Spread to wild fish - Retarded decomposition of organic material’ (p.39).

‘From Lindesnes and northward, aquaculture contributes heavily to the total discharges of nitrogen and phosphorus salts. The discharges of these nutrient salts and organic materials have increased in step with the growth in volume of Norway's farming of salmonids. Even though the industry's measures to improve feed quality and reduce feed spills have reduced the discharges per tonne of fish produced, this reduction has been counteracted by an increased production volume. Continued growth in the farming of salmonids in addition to scaling up the production of other farmed species will lead to increased discharges of nutrient salts and organic material to Norway's coastal and fjord areas. Even though fish farming is responsible for a large part of these discharges, these discharges do not necessarily constitute a large addition of nutrients compared with natural levels, and compared with what is added by ocean currents from foreign discharge sources’ (p.43). ‘Such discharges can result in local pollution problems if the releases exceed the fjord area's carrying capacity. This may be the case if the farm is operated in areas with poor water exchange. In Norway, fish farming is done today largely in good locations, so that the release of nutrient salts and organic material is quickly diluted and dispersed in the ocean, where they do not pose an environmental problem’ (p.10).

‘To prevent the fouling of fish farm nets by shellfish, algae and other organisms, it is common to impregnate them with copper compounds. Eighty per cent of the impregnating material is
dissolved while the net is in the water. Fish farming in Norway releases about 200 tonnes of copper per year. Since copper is considered an environmental toxin, any releases are undesirable. There are alternatives to copper impregnation, and Bellona would like copper impregnation to be phased out eventually’ (p.10). ‘Leaching of copper from fish farm nets and discharges of copper from net cleaning facilities comprise aquaculture's chief addition of environmental toxins to the marine environment’ (p.44).

‘Farmed salmon are fed with pellets made of fish oil, fishmeal, vegetable oil and vegetable protein. It has been discussed whether farming salmon is a proper use of resources, since the feed used can feed people. A special focus has been on the use of fishmeal and fish oil’ (p.11). ‘So-called forage fish, which are used in the production of fishmeal and fish oil, are also food for other species of fish in the sea – species that are higher up on the food chain. Harvesting of forage fish can thus reduce the availability of food to major species of edible fish, particularly cod’ (p.49).

‘One-third of the world's fish catch goes to grinding and production of marine meal and marine oils. According to the FAO, fish stocks used for this purpose are currently fully taxed. We therefore cannot base ourselves on the future need for these resources being covered by an increased harvest of the listed species of fish. Continued growth of aquaculture therefore requires that other sources of raw materials be found for the production of fish feed. Stocks used as fishmeal and oil in South America have been the subject of wide fluctuations, both in consequence of overfishing and natural variations in the availability of food. Anchoveta stocks have recovered since the last great El Niño in 1998. Sardine stocks have, however, plummeted, and Peru, Chile and Ecuador should reduce fishing for this species to a minimum to get stocks up to a more sustainable level […]. In our waters fishing for blue whiting is far higher than recommended by scientists. The lack of international agreements and conflict about how many parties are entitled to fish have led to virtual "free fishing" of this species. […] [F]ishing for horse mackerel in certain areas is alarming. A far too high harvest of younger fish does not represent sustainable fishing’ (p.59).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

Under the assumption that the production of salmon is done with two-thirds fish oil and one-third vegetable oil in the feed, Bellona’s calculations ‘have shown that 2.66 kg of fish yields
enough fish oil and more than enough fishmeal for the production of 1 kg of salmon, [...]. Consequently, 5 kg of fish, which was previously usual, is not necessary’ (p.51). ‘Globally speaking, there is a considerable variation in how much vegetable oil that is used, but because of adequate access [...] to such raw materials, there is reason to expect that this will be a growing trend. We can consequently establish that the claim "Five kilograms of wild fish becomes one kilogram of farmed salmon" no longer fits with reality. Of course, the vegetable raw materials come in addition to the fish, but the point is that salmon are in the process of taking a step down the food chain, virtually to the same trophic level as pigs and chickens. [...] [S]almon farming [...] provides better resource utilisation than grainbased livestock production on land. Even though the proportion of fish in the feed has been reduced to 2-3 kg per kg of salmon, and developments in feed composition mean that we can increase the production of salmon on the basis of a given quantity of wild fish, access to forage fish sets a limit on how much farmed fish we can produce. And that limit [...] has already been reached, and has in fact been exceeded for some stocks.’ (p.64).

‘If salmon farming is ever to be called sustainable, an important criterion is that the resources used for feed are harvested in a sustainable manner. The fish stocks in the world that go into fish feed today are [...] fully utilised, and there is no room to tax them further. Any growth in global production in fish farming will therefore have to be based on sources of feed other than fish oil and fishmeal. Currently, various vegetable ingredients are increasingly being used’ (p.11). ‘[B]ut [w]hen the potential for increasing the percentage of vegetable raw materials has been exhausted, other resources will have to be sought if production is to continue to increase. The nutritional needs of the salmon make it impossible to use one feed consisting only of vegetable raw materials, unless there is a concentrated effort to change vegetable fatty acid and amino acid profiles with the aid of gene technology. Due to the risk of major, adverse environmental impacts associated with transgenic plants in agriculture, this is a development path Bellona is extremely sceptical of’ (p.64).

‘In addition, a substantial percentage of today's production of, for instance, soya and maize is based on transgenic plants. The policy of the fish farming industry in Norway is to avoid transgenic plants in fish feed. The main reason is consumer scepticism towards such products’ (p.60-61).
Other possible alternatives for the future are proteins produced with the aid of natural gas, marine resources harvested on lower trophic levels and the cultivation of algae [...]. Even though the primary production of biomass is almost as high in the oceans as on land, only a small percentage of the food we eat comes from the sea. The reason is that we primarily harvest from the top of the marine food chain, whereas we have based our food production on land on the cultivation of plants and the raising of herbivores. The immense production of biomass in the sea constitutes an enormous potential for food production, which can be exploited with the aid of cultivating and harvesting at lower levels of the food chain. Such developments should be based on knowledge and respect for the balance and carrying capacity of marine ecosystems’ (p.11). Comprehensive documentation remains before we can draw conclusions about the way forward’ (p.64).

The categories "propeller damage", "handling", "installation malfunction" and "technical malfunction in hatchery" all together comprise 53.1 per cent of the number of escaped fish. [...] Although the weather cannot be blamed on fish farmers, questions may be raised about fish farms located in the sea that do not withstand bad weather. [...] Damage by predators, responsible for 20.5 per cent of escapes, may also be discussed in this manner. [...] The general requirements of the Aquaculture Act for adequate technical standards are now being fleshed out with a new regulation relating to "technical standards for installations used in fish farming activities". [...] To address this, the standard will include a system for classifying locations by the environmental impacts the installation will be subjected to’ (p.16-18).

At a threshold of 0.5 lice per fish, increased fish farming activities will lead to increased salmon lice production. To stop the growth of production of salmon lice and prevent increased infestation pressure on wild stocks, the threshold for the permitted number of lice per fish must continually be reduced. A lower limit for obligatory delousing, however, seems too many to be difficult to implement. The alternative would be to stipulate a carrying capacity for what a fjord area can tolerate of salmon lice. In that case fish farming activities must be adjusted on the basis of how much salmon lice the individual system tolerates. [...] Measures to reduce the escape of farmed fish will in this way help to reduce the infestation pressure on stocks of wild salmonids’ (p.28).

'[A]n important part of the solution to the louse problem is effective chemotherapeutic treatment, which in turn creates another environmental problem, namely, pollution of the
Since the spread of salmon lice from fish farms to emigrating wild smolt is reckoned to be a central environmental problem in fish farming, two different environmental problems need to be weighed against each other’ (p.30).

‘Wrasse have the potential to render the use of antiparasitic drugs superfluous, but until this potential is realised, using these agents cannot be avoided. The use of wrasse against salmon lice can and should be a more central form of treatment, but several challenges remain before the use of chemicals can be replaced by a non-polluting louse treatment. A greater effort especially in disseminating knowledge about routines for this non-polluting form of treatment is therefore imperative’ (p.38).

‘The reason for the rapid decline in Norwegian antibiotic use is primarily due to the availability of effective vaccines against the chief bacterial infections, as well a generally better fish health as a result of more suitable operation locations, less stress and improved hygiene against contagions’ (p.39). ‘Therefore, it is good news that the use of antibacterials in the Norwegian fish farming industry has nearly been eliminated in fifteen years, from 50 tonnes to about 1,000 kilograms. Nonetheless it is important to keep the focus on this issue in countries where the development of vaccines and general preventive health efforts have not come as far, and where considerable antibiotic use continues to be maintained’ (p.40).

‘[D]ischarges [of nitrogen and phosphorus salts] are harmful only if they exceed the carrying capacity of the area in question. As long as the discharges do not exceed this, they may have a positive impact on the productivity in the area and not inflict any harm on the environment. The challenge linked to discharges of this type is therefore to calculate the carrying capacity of the location and adjust fish farming activities accordingly. […] [A] new system for modelling and monitoring fish farms (MOM)\(^\text{30}\) will perhaps be able to give the government and the industry a better basis for tailoring production and discharges to the location's carrying capacity’ (p.43).

‘Bellona believes that the authorities should put pressure on aquaculture to encourage a phase-out of copper impregnation of nets. Long-term policy instruments should be implemented to provide for a gradual changeover to copper-free alternatives, with a predictability and long-

\(^{30}\) Norwegian abbreviation translated as Modelling – Ongrowing Fish Farms – Monitoring (p.42).
range nature that gives fish farmers the best possible basis for deciding on future investments in technology’ (p.46).

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

‘Environmental toxins like heavy metals, PCBs and dioxins from previous and current discharges accumulate in the marine food chain and may therefore present a problem to fish farming based on raw materials from fish. Strict monitoring of raw materials and products is therefore necessary to ensure safe seafood’ (p.11).

‘It is mainly the market – subject to different political operating conditions – that decides how the various food resources are utilised. To increase the share of soya meal used directly as food for humans, the willingness to pay for soya as food must rise so that farmers can achieve higher prices for their crops from food processors than they do from feed producers. The same applies to forage fish. If fishmeal manufacturers receive more money for the meal from, for example, fish cake producers than they do from manufacturers of fish feed, more fish cakes and less feed will be produced. The result of economic development is, however, usually the opposite. Greater prosperity creates higher demand for "exclusive" meat, both from land-based livestock production, fisheries and fish farming […] On the world market, the richest countries account for the demand for such products. Poor people who would be happy to eat both soya and fishmeal have less purchasing power than the feed industry in the Western world. Should a global food shortage occur that hits more than just the poorest, higher demand for food will yield higher production of food based on what we currently use as feed. Unless we want to introduce a new economic world order, there is little we can do with the fundamental mechanisms in the market. Through development aid, reduction of various trade barriers and forgiveness of debt, however, the imbalances can be evened out, but this is a completely different debate for which there is no space to discuss here’ (p.48-49).

‘Fishmeal and fish oil are important protein and fat sources for the fish farming industry. Of the world’s total catch of fish, approximately 30 per cent goes to produce fishmeal and fish oil. […] Fishmeal and fish oil are important sources of fat and protein for farmed fish, although other industries also use these resources. The trend, however, is clear: more and more of the world's fishmeal and oil are used in aquaculture. In 2000, 35 per cent of the
fishmeal and 57 per cent of the fish oil were used in aquaculture. IFFO \(^{31}\) expects that this will increase, respectively, to 56 per cent and 98 per cent in 2010’ (p.52-53).

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<th>1988</th>
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<th>2010</th>
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<tr>
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<td>35 %</td>
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<td>9 %</td>
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‘Table 7\(^{32}\): Distribution of the different usage of fishmeal, and forecast for 2010 (Source IFFO)’ (p.53).

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<td>Pharmacy</td>
<td>0 %</td>
<td>2 %</td>
<td>1 %</td>
</tr>
</tbody>
</table>

‘Table 8: Distribution of the different usage of fish oil, and forecast for 2010 (Source IFFO)’ (p.53).

‘One source of major quantities of fish raw materials is found among what is already fished, but for various reasons is thrown back into the sea.’ The global discarding of fish has been estimated to be 27 million tones. ‘This means that millions of tonnes of protein are dumped annually into the ocean.’ ‘In Norway, the authorities have adopted a zero discard policy. It is illegal for commercial fishermen to throw back any of the catch to the sea’ (p.60).

‘On land […] we have accepted complete alternation of the ecosystems. Cultivation of land has displaced wilderness, livestock have displaced wild grazing animals and wild predators have been exterminated to protect livestock. Should we then exterminate the cod to protect more productive species lower down the food chain? Bellona does not think so’ (p.49).

\(^{31}\) International Fishmeal and Fish Oil Organisation  
\(^{32}\) The table number refers to the number used in Bellona (2003).
6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

‘Aquaculture has quickly developed into one of Norway's most important export industries. [W]e believe […] that in the future old and new forms of food production based on marine resources will be a growing factor in the Norwegian economy’ (p.6).

‘[I]t is important to note that [fishmeal and fish oil] resources are largely used for animal feed in any case. With this in mind, salmon farming is an efficient use of resources, since salmon utilise the feed more efficiently than chickens or pigs’ (p.11). ‘Theoretically speaking, we can entertain various means to achieve a more "efficient" utilisation of resources. For example, a global prohibition against using fish raw materials as feed for fish or farm animals would mean a reduction of the demand for this raw material, thereby precipitating a drop in prices. The adjustment of producers (including commercial fishermen) to this new market would in the long term yield a lower production volume. The smaller the demand for the species of fish in question, the smaller the supply on the market will become. If we assume that a prohibition would reduce the production volume to under a third, this would cause a loss of food resources exceeding the loss seen by letting the raw material go through salmon farming, taking into consideration that only 30 per cent of the protein in the feed recurs in the salmon fillet’ (p.49).

‘Cod and other species of edible fish are predatory fish in the same way as salmon, and they are found on the same trophic level on the food chain. In theory, we get more out of forage fish when they are taken out of the sea and fed to salmon than when we let them be food for wild cod because feed utilisation is optimised in aquaculture. But such reasoning is too simple. The sea's ecosystem is complex. You cannot mathematically calculate which species and which level on the food chain will provide the biggest yield, and manage the stocks only by this. Marine biomass production is dependent on a well-functioning interaction between the species and to prevent an imbalance the harvesting of individual stocks must be viewed from a comprehensive perspective’ (p.49).

‘Compared with other feed concentrate-based livestock production, salmon farming is extremely efficient in terms of the utilisation of energy and protein in the feed. […] Salmon utilises the energy in the feed twice as efficiently as chickens, and 70 per cent more efficiently than pigs. For protein the ratio is similar: Salmon utilise protein 70 per cent more efficiently
than chickens, and twice as efficiently as pigs. Such a comparison between different types of livestock becomes most relevant if they compete for the same sources of feed. Traditionally, salmon have mainly been fed marine raw materials, which in the production of chickens and pigs have only been used in smaller amounts as an appetiser. […] We can expect continued higher demand for this raw material in agriculture. When farmed fish and terrestrials are increasingly being fed the same raw materials, the comparison of feed utilisation is extremely relevant, and we see that it is more beneficial in salmon farming instead of other types of livestock production’ (p.50).

6.2.4 FIVH – questions 1 to 6

When only page numbers are given, the references are to the FIVH report *Matproduksjon eller matdestruksjon?* (FIVH 2002) about fish feed production.

1) *What are your primary interests in relation to ecological entities?*

FIVH was founded as a movement in search of a new lifestyle and a more humane society based on solidarity with the world’s poor, on ecological balance and a reassessment of personal values (FIVH 2007).

FIVH is ‘based on the following values:

- A commitment to active consideration for our fellow human beings, instead of consumption.
- Equal rights for everybody.
- Co-responsibility for the environment’ (ibid.).

2) *Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?*

‘More than one billion people today are undernourished and underweighted, and there is a need for using forage fish and agriculture products directly for food. Many of the fishery resources used for feed today have traditionally been important food for poor people because it has been available at affordable prices. Import to the Norwegian fish farming industry comes partly from countries that have problems with undernourishment and malnutrition among their citizens, such as Peru, Chile and Brazil. According to FAO it is an increasing problem that a consequence of the globalisation of the fish market is that fish disappears from
the local fish markets in countries where large groups of the population are poor. Norwegian fish farming is one of the operators in the global fishmeal and fish oil market that contributes to this’ (p.4 translated).

3) *What negative impacts do salmon farming-related activities and agendas have on ecological entities?*

‘Salmon farming is regularly linked to environmental and animal ethical problems. Pollution, escapes and disease transmission makes the farming locations along the coast an increasing environmental problem and a significant threat to the wild salmon stocks’ (p.9 translated). Since FIVH is also a member of the Norwegian Network of ten NGOs, the negative impacts of pollution, escapes and diseases will not be repeated. The focus will be on the threat that salmon farming might represent in relation to the world’s food security (p.9). Connected to this is ‘the increased pressure catches of wild fish resources for fish feed production have on already overexploited stocks of bigger consume fishes[^33]. This is, in their opinion, a topic that is given little attention in the public debate’ (p.41).

‘Norwegian fish farming weaken the world’s food security and increases the pressure on already overexploited fish stocks. About 11 % of the fat and 3.5 % of the protein of the world’s total fishmeal production is used by Norwegian salmon farming. In addition, more than 200,000 tonnes of vegetable food disappears in this abyss. One third of the world’s fish catches are used for production of fishmeal for fish and animal feed. Continuously strong growth in Norwegian fish farming, as it is run today, contrasts strongly with responsible resource management’ (p.3 translated).

‘[M]ost of the fish used for production of fish feed is very well suited for human consumption, and for health concerns probably more valuable for human consumption than for salmon feed. The fish species used most in salmon feed production are anchovy, sprat, capelin, blue whiting, sardine/pilchard, herring, horse mackerel, sand eel and Norway pout […] It is evaluations of profit, and cultural preferences, that decide whether the fish is used for salmon feed or for human consumption’ (p.3 translated).

[^33]: Examples of wild consume fish stocks in the Northern Atlantic Ocean are such as herring, cod, saithe and mackerel species. This represents an annual harvest of around 2,500,000 tonnes of fish (SSB 2007).
‘Using wild fish and agriculture products for salmon feed instead of directly for human consumption, Norwegian salmon farming contributes annually, via reduction to meal and fish oil, to a colossal loss of food. Normally 3-6 kilograms of fish are needed to produce one kilogram of salmon. From moderate estimates, 1,670,000 tonnes of consume fish were used to produce 569,653 tonnes of salmon in 2000. This represents a loss of 1,100,000 tonnes of consume fish. In addition more than 200,000 tonnes of products from vegetable resources like wheat, corn and soya were lost for human consumption’ (p.3 translated).

‘The feed use in the salmon farming industry also has consequences that indirectly reduce the amount of fish resources available for human consumption. The catches of wild fish for feed have in many ways an impact on the ecosystem in the ocean that is negative for the stock sizes of the bigger consume fish species, and it contributes to increased pressure on the world’s already overexploited fisheries resources’ (p.3-4).

‘The fish feed producers are trying to substitute some of the marine raw materials with agriculture raw materials. Corn, wheat, soya and raps oil have become important vegetable ingredients in the feed. It is a problem, however, for the salmon farming industry that that the salmon may be less popular if it does not continue to have a high content of healthy Omega-3 fatty acids. This can be the result if too large proportions of vegetable oils are used. Research is going on to try to manage these obstacles by gene modification’ (p.8 translated).

‘Salmon farming uses tremendous amounts of valuable food for production of far less amounts of salmon. […] This is seen as part of the global fight for resources where the poor people in developing countries are the losers’ (p.9).

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

‘Instead of using many resources to secure continuous growth in salmon farming, the industry, fishery authorities and research institutions should make a considerable effort in making fish farming less resource intensive and environmentally damaging. The forage fish should to a greater extent be used as food and the pressure on overexploited fish stocks should be reduced.’ ‘If basic changes are not done in feed production, then the multiplying of salmon production during next 20 years, as planed by the industry and the authorities, will be in strong contrast with the objectives of a sustainable Norwegian aquaculture industry.’
‘Concentrating on aquatic plants and herbivore species, such as molluscs, can make aquaculture less environmentally damaging and be a positive contribution to the world’s food security’ (p.4-5 translated).

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

‘A large and increasing part of Norwegian fish, meat and milk production is based on raw materials that are useful as food for humans. When used for raw materials for animal feed instead of directly for human consumption, a great deal of the nutrient value is lost for human consumption. […] The traditional farming of cows, sheep and goats [is] […] able to utilise feed that have no direct nutrient value for humans. This is not possible when farming salmon, poultry and pork – the main growing Norwegian meat-producing industries. […] The global trade of nutrients makes it possible for Norwegian fish farming and agriculture in an increasing extent to function as production units that consume considerably more food than what they produce’ (p.7 translated).

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

FIVH refers to statements saying that Norwegian aquaculture has a potential for value creation of the same magnitude as the oil industry (FIVH 2007 p.7).

6.2.5 Results from the examination of the environmental group – values and threats

Again the results from the examination are presented in two subsections. In the first subsection the results from the answers to question 1, 2 and 6 are presented in a flourishing matrix, while the second subsection contains the result of the answers to questions 3, 4 and 5, about threats to the values behind biodiversity.

The environmental group – flourishing matrix

For the environmental group the answers to question 1 include calls to a number of broader issues related to concerns about values behind biodiversity. These are such as stopping the degradation of the planet’s natural environment, ensuring the sustainable use of renewable
resources, not exceeding the carrying capacity of nature, striving for clean oceans, and preserving nature's diversity. Also mentioned is the production of food, and basing human societies on solidarity with the world’s poor and on ecological balance. On this basis I found it reasonable to say that the environmental group has primary interests related to all the three values behind biodiversity which question 1 focuses on. This means that the values behind wild salmon, their habitats and commercial wild fish stocks are noted together with farmed salmon in the heading of the flourishing matrixes of the environmental group. It should be recalled that the term commercial wild fish stocks also includes fish resources utilised in local small-scale artisanal fisheries.

**Mind photo 6.3 Flourishing matrix – environmental group**

<table>
<thead>
<tr>
<th>Values behind biodiversity</th>
<th>Types</th>
<th>Descriptions</th>
<th>Ecological entities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Types</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life domain</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Life values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal welfare, intrinsic value</td>
<td></td>
<td>Wild salmon and their habitats</td>
<td></td>
</tr>
<tr>
<td>Intrinsic value</td>
<td></td>
<td></td>
<td>Farmed salmon</td>
</tr>
<tr>
<td>Animal welfare, intrinsic value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Biological domain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Necessary life support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>food sources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local food security</td>
<td></td>
<td></td>
<td>Commercial wild fish stocks</td>
</tr>
<tr>
<td>Efficient resource utilisation, food security, food safety and healthy food</td>
<td></td>
<td>Farmed salmon</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural domain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purely instrumental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>economic values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild fish catches, genetic source for salmon farming</td>
<td></td>
<td>Wild salmon</td>
<td></td>
</tr>
<tr>
<td>Wild fish catches</td>
<td></td>
<td></td>
<td>Commercial wild fish stocks</td>
</tr>
<tr>
<td>Employment and export revenue</td>
<td></td>
<td>Farmed salmon</td>
<td></td>
</tr>
<tr>
<td><strong>Recreational values</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Aesthetic values</td>
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<td></td>
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<tr>
<td>Scientific values</td>
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<td></td>
<td></td>
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<tr>
<td>Evolutionary values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future generations</td>
<td></td>
<td></td>
<td>Wild salmon and commercial wild fish stocks</td>
</tr>
<tr>
<td><strong>Symbolic values</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious values</td>
<td></td>
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</tbody>
</table>

As for the wild salmon group, the rationales behind the selected descriptions of values behind biodiversity, as they appear in the flourishing matrix of mind photo 6.3 for the environmental group, are explained in the following. These descriptions are again primarily based on the
answers to question 2, and sometimes notifications given in the answers to the other questions also are used as a basis for the descriptions.

**Life domain – life values**

Perhaps the strongest statements about the life value type of the life domain made by the environmental group is that salmon is a highly revered species, and that all living beings and the richness and diversity of life forms have intrinsic value. This means that nature should be protected even if it has no direct utility value for humans. It is not specified, however, on what grounds it should be so. In the answers to question 3, Friends of the Earth refers to animal ethics and the well-being of farmed fish. This concerns such as unnecessary suffering, stock densities, diseases, bad water quality, artificial lightning of the pens, handling of the fish and painless slaughtering process. They also mention that strong requirements to animal welfare in the production are necessary.

By the reference from Friends of the Earth to intrinsic value, the environmental group is more specific than the wild salmon group about life values. Despite that, the environmental group, just like the wild salmon group, is not really explicit with regard to whether salmon, and for that matter any other kinds of fish or ecological entities, might be said to have values as ends in themselves. Nothing is said that might be used as proposed value-conferring properties for ascribing a direct moral status value to salmon or other ecological entities. Nonetheless, since I see a slightly stronger animal welfare message here, I suggest “animal welfare”, this time without brackets, as a description of the life value seen from the perspective of the environmental group. I will also add the notion of “intrinsic value”, though this is not clearly defined. These descriptions are noted both for the farmed and the wild salmon, since Friends of the Earth says that intrinsic value applies to all living beings. It is more uncertain whether intrinsic value also applies to supra-individual entities, though this might be indicated by the notion that nature should be protected even if it has no direct utility value. “Intrinsic value” is therefore added in brackets for the wild salmon habitats.

As a link to the following discussion of life support values, Friends of the Earth mention the recognition that humans are part of nature. This might support the above considerations in the sense that it might indicate that nature might, on a par with humans, have a kind of life value. It might also be understood more prosaic, however, in the sense of recognising that humans are fully dependent on the biological domain for their survival, growth and reproduction.
Biological domain – *necessary life support food sources*

One of the references in the examination of the environmental group that points towards the necessary life support food sources of the biological domain is the one mentioned about the clean oceans. This is addressed by Bellona when they, in response to question 1, say that the clean oceans are a basis for food production to sustain future populations, combined with the recognition of the fact that humans live from harvesting nature’s bounty. In line with this is FIVH’s concern for the solidarity with the world’s poor people. They say that many of the fishery resources used for animal feed today have traditionally been important food for poor people because it has been available at affordable prices. Friends of the Earth supports this when they, in response to question 3, say that fish stocks used for fish feed production might play an important role in the food security context if used for human consumption directly.

Part of this food supply refers to what I think of with the reference to artisanal fisheries. FIVH sees this as part of the global fight for resources, where the poor people in developing countries are the losers. As an example they mention that import to the Norwegian fish farming industry comes partly from countries that have problems with undernourishment and malnutrition among their citizens, such as Peru, Chile and Brazil. FIVH explains further that more than one billion humans today are undernourished and underweighted, that there is a need for using forage fish directly for food, and that a consequence of the globalisation of the fish market is that fish disappears from the local fish markets in countries where many are poor. On the basis of these references I have decided, as shown in the flourishing matrix, to use the term “local food security” in relation to the life support values of the commercial wild fish stocks.

Cultural domain – *purely instrumental economic values and particular inner worth*

The environmental group says little about the purely instrumental economic values. The clearest reference is the studies referred to by WWF, showing that if wild salmon resources in Norway were restored and utilised in a sustainable manner the economic value could be at least between NOK 2-4 billion annually. In addition to this, all the above references to the life support value of wild fish stocks certainly also points towards economic valuations of these resources, though no economic figures are referred to. I have therefore decided to use the term “wild fish catches” to characterise how the environmental group perceives the economic value behind wild salmon and the commercial wild fish stocks, including fish resources utilised in artisanal fisheries. Added here should also be WWF’s statement that the genes of wild salmon
stocks contain information that the salmon farming industry may need to solve future problems. This is noted on the flourishing matrix by the term “genetic source for salmon farming”.

With regard to the rest of the value types within the cultural domain, the environmental group says little or nothing in line with the value descriptions given by the wild salmon group. One exception is the answers to question 3, which emphasise that escaped farmed salmon threaten the genetic and ecological integrity of wild salmon populations. This answer points towards the evolutionary value type, as do all the references linked to the life support value about the threats to the future of the commercial wild fish stocks. In the flourishing matrix I therefore only note “future generations” as an additional value within the cultural domain.

Positive effects of farmed salmon – question 6
The environmental group goes a bit further than the wild salmon group in describing positive effects of salmon farming. WWF says that they recognise the potential value to society of aquaculture in terms of providing food security, revenue and an alternative food source to wild-caught fish. Friends of the Earth sees fish farming as one element in the bigger picture of sustainable food production, and adds that a more environmentally friendly fish farming industry will in the long run contribute to stable employment. Bellona is positive towards aquaculture as an idea, and mentions that it has developed to be one of Norway’s most important export industries. They say that salmon farming is an efficient use of resources, since salmon utilise the feed more efficiently than chickens or pigs. Bellona mentions that a global prohibition against using fish raw materials as feed for fish would mean a loss of food resources. This is a loss, Bellona says further, exceeding the loss seen by letting the raw material go through salmon farming. They hold that compared with other feed concentrate-based livestock production, salmon farming is extremely efficient in terms of the utilisation of energy and protein in the feed. Bellona adds that in theory we can get more out of forage fish when they are taken out of the sea and fed to salmon than when we let them be food for wild cod. They ultimately emphasise, however, that the sea’s ecosystem is complex, and that you cannot mathematically calculate which species and which level of the food chain will provide the biggest yield. FIVH refers to statements saying that Norwegian aquaculture has a potential for value creation of the same magnitude as the oil industry.
Based on the above, I have noted in the flourishing matrix “efficient resource utilisation” and “food security” as necessary life support food sources, and “employment and export revenue” as purely instrumental economic values behind farmed salmon.

In addition to these issues, the environmental group is also concerned about farmed salmon as a safe and healthy food source. I have therefore added “food safety” and “healthy food” in the flourishing matrix as a necessary life support food source value behind the farmed salmon. In the answers to questions 3 and 4 about threats and handling of threats, the environmental group refers to issues related to safe and healthy food. These are issues which they almost take for granted that the salmon farming industry is able to handle. For the future of the industry it is actually a necessity that the produced salmon are safe and healthy. Friends of the Earth says that food offered in the marketplace should be of the best possible health quality, that consumers should be assured that the fish on offer is healthy food, and that they know what they are eating. They stress the EU zero tolerance for medicine remnants in fish, and say further that gene-modified fish, gene-modified raw materials in fish feed and gene-modified vaccines are unacceptable. Both WWF and Bellona refer to scepticism among consumers towards gene-modified plants as raw materials in salmon feed. WWF demands that the development of genetically modified fish should be avoided, and that fish feed should be free of genetically modified plants and animals. Bellona mentions, in connection with question 5, that environmental toxins, such as heavy metals, PCBs and dioxins from previous and current discharges, accumulate in the marine food chain and may present a problem to fish farming based on raw materials from fish. They therefore recommend strict monitoring of raw materials and products to ensure safe seafood.

**The environmental group – threats to values behind biodiversity**

As for the wild salmon group, mind photo 6.4 shows the threats overview scheme with a summary of the main issues addressed in the answers of the environmental group to questions 3, 4 and 5, which are respectively about threats to values behind biodiversity caused by salmon farming activities and agendas, threats that should be handled and given priority by the salmon farming industry, and threats caused by other kinds of activities and agendas.
### Mind photo 6.4 Overview of threats to values behind biodiversity – *environmental group*

<table>
<thead>
<tr>
<th>- threats to values behind biodiversity from the perspective of the environmental group</th>
<th>- threats for possible practical handling in relation to the ethical challenges of the salmon farming industry</th>
<th>- threats out of control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
<td>Threats caused by other activities and agendas (question 5)</td>
</tr>
<tr>
<td>Escapes incl. genetic and biological interactions</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon lice</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fish diseases</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pollution</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Area use</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Handling of farmed salmon</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon overfishing</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Forage fisheries and overfishing</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fishmeal and fish oil for fish feed production</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternative feed resources</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Climate change and fossil energy</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**The environmental group – column for threats caused by salmon farming**

Many of the threats mentioned by the environmental group are more or less similar to those addressed by the wild salmon group. These are threats related to such as release of nutrients and heavy metals, escaping farmed salmon, genetic and biological interactions, disease problem, salmon lice, pollution, antibiotics, fish husbandry, stock density and fallowing. I have therefore marked in mind photo 6.4 that the environmental group, just like the wild salmon group, perceives salmon farming activities and agendas to be a threat to values behind biodiversity due to incidents sorted under the labels “escapes”, “salmon lice”, “fish diseases”, “pollution” and “area use”.

An additional threat addressed by the environmental group is use of GMO. Gene-modified fish, raw materials in fish feed and vaccines are seen as unacceptable, both because of the negative effects they might have on the environment if released into nature, and because of
the mentioned food safety-related scepticism among consumers towards such products. Since GMO is perceived by many consumers as an unwanted substance, I have decided to see this as part of the pollution problem, and thus to belong under the “pollution” label in mind photo 6.4.

Due to the reference to animal ethics and the well-being of farmed salmon I have also marked the row labelled “handling of farmed salmon”. This refers, as mentioned, to such as unnecessary suffering, stock densities, diseases, bad water quality, artificial lightning of the pens, handling of the fish and the slaughtering process.

The row labelled “climate change and fossil energy” is marked because the environmental group perceives salmon farming activities and agendas to represent a threat to values behind biodiversity due to climate change and fossil energy use. This is based on the use of fossil energy, such as in long-range transportation of fishmeal and fish oil for fish feed production, and the transportation out again of the farmed fish to the markets worldwide.

In addition, three new rows are added in mind photo 6.4. They are labelled “forage fisheries and overfishing”, “fishmeal and fish oil for fish feed production”, and “alternative feed resources”. One general comment given by the environmental group in relation to these is that the overall result of salmon farming, via the reduction of forage fish to fishmeal and fish oil and via use of vegetable resources, is a colossal loss of food every year. This general statement will be elaborated further in the following.

Forage fisheries and overfishing:
The row labelled “forage fisheries and overfishing” refers to threats to commercial wild fish stocks caused by forage fisheries of raw materials for production of fishmeal and fish oil. This is such as when WWF says that the increasing demand for high quality seafood entails that aquaculture is on a destructive path, something that might pose a threat not only to wild fish stocks, but also to the industry’s own long-term potential. The argument of the WWF is that the 4 kg of wild-caught fish required to produce 1 kg of farmed salmon will severely exploit forage fish stocks, something which could ultimately lead to serious environmental disturbances. One consequence of this is that the demand for fishmeal and fish oil directly puts pressure on the forage fisheries, which according to Bellona are currently fully taxed. Another consequence, Bellona says, is that harvesting forage fish for fishmeal and fish oil
production can reduce the availability of food to major species of edible fish. Also FIVH refers to the increased pressure that catches of wild fish resources for fish feed production put on already overexploited stocks of bigger consume fishes, and thus on the amount of fish resources available for human consumption. They hold that Norwegian salmon farming, through their demand for fishmeal and fish oil, weakens the world’s food security and increases the pressure on already overexploited fish stocks.

A possible result of this, described by Friends of the Earth, is a situation where Norway ends up as a net importer of fish, because the increased production of farmed fish will demand more that one-tenth of the world’s total capture fisheries production. The result would be that the wild fish stocks are fished down, and fish farming would be unable to replace the ocean’s natural food production. Simultaneously, Norway’s large amounts of the world’s capture fisheries would be used to produce fish for the world’s most affluent citizens. An additional effect is shown by the example mentioned that the import of fishmeal and fish oil from Chile, and the export of low-priced Norwegian farmed fish to India, out competes local Indian fishermen.

Fishmeal and fish oil for fish feed production:

The next new row in mind photo 6.4, labelled “fishmeal and fish oil for fish feed production”, refers to the situation that fishmeal and fish oil are already available on the global market, and as such represent food sources that are directly valuable as possible necessary life support food for the poor. Addressed here are the threats that the use of fishmeal and fish oil for fish feed production might represent to poor people’s access to necessary life support food. In connection with question 5, about other human activities and agendas that might have negative impacts on ecological entities, Bellona states that poor people, who would be happy to eat fishmeal, have less purchasing power than the feed industry. As an example they mention that if fishmeal manufacturers are paid more by fish cake producers than by fish feed producers, more fish cakes and less feed will be produced. In short, this means that as long as fishmeal and fish oil is a commodity operating on the global market, salmon farming represents a threat to the possibilities of poor people to use fishmeal and maybe also fish oil to satisfy their necessary life support needs.

Another aspect of this food security issue is that most of the fish used for the production of fish feed is, according to the environmental group, very well suited for direct human
consumption. This again involves the artisanal fisheries. Together, therefore, the row in mind photo 6.4 labelled “fishmeal and fish oil for fish feed production” represents a twofold threat to poor people’s access to necessary life support food. On one side is a threat to the access to the forage fish stocks as a direct food source, and on the other is access to the fishmeal and fish oil produced from the forage fish.

Alternative feed resources:
Bellona mentions that the continued growth of aquaculture requires that other sources of raw materials be found for the production of fish feed. One such alternative feed resource is krill. The use of krill is problematic and represents a threat because large-scale harvesting of this important species in the food web could have severe knock-on effects on the marine ecosystems if sufficient caution is not shown. Another worry mentioned in relation to alternative feed resources is the use of vegetable raw materials, namely that the relevant plant production has direct and indirect impacts on natural habitats of high conservation value and on the livelihoods of people and endangered species that depend on those habitats. These issues are addressed by the row labelled “alternative feed resources”.

The environmental group – column for threats that should be handled by the salmon farming industry
As with the wild salmon group, threats which the environmental group emphasises the salmon industry should handle are associated with activities and agendas sorted under the labels “escapes”, “salmon lice”, “fish diseases”, “pollution” and “area use”. Examples here are such as the need to minimise genetic and biological interactions between farmed and wild salmon, to avoid disease transmission and the spread of parasites, and to avoid adverse effects associated with discharges of waste nutrients as well as toxic chemicals, antibiotics or other substances that harm the environment. Some measures mentioned are the exclusion of new operations from sites detrimental to wild salmon, more adequate enforcement actions for monitoring escape prevention, use of wrasse against salmon lice, keeping focus on the rapid decline in Norwegian antibiotic use, phasing out copper impregnation of nets, and use of MOM to calculate the carrying capacity of a location and adjusting fish farming activities accordingly.

The environmental group also emphasises, as already mentioned in relation to safe and healthy food as values behind farmed salmon, that the salmon farming industry needs to be
able to handle pollution-related problems that threaten the food safety of farmed salmon. Their concern is that consumers should be assured that the fish on offer is safe and healthy food, and they should know what they are eating. This refers both to pollution caused by the salmon farming industry and pollution caused by others. For the pollution-related issues caused by the salmon farming industry, this is primarily to comply with EU’s zero tolerance for medicine remnants in fish and to secure that the salmon farming industry does not develop genetically modified fish. For the pollution caused by others, the salmon farming industry should secure that the levels of toxins, such as heavy metals, PCBs and dioxins, are below acceptable levels. The industry should also guarantee fish feed free of genetically modified plants or animals. All these issues are associated with the row labelled “pollution” in the column about threats that should be handled by the salmon farming industry.

Efforts associated with the row labelled “handling of farmed salmon” are such as responsibility in the production with regard to animal welfare and to adjust fish husbandry in accordance with best industry practices. This includes physical handling of the fish, as well as year-class separation, falling of sites, maximum stocking densities and painless slaughtering.

Further in connection with threats related to the rows labelled “forage fisheries and overfishing” and “fishmeal and fish oil for fish feed production”, the environmental group says that fish used for fish oil and fishmeal should only come from healthy, well-managed and sustainable fish stocks, that local fishing traditions in other countries should be respected, and that feed should as much as possible be based on local and renewable resources. Fish feed should in general not be based on raw materials that might be used for human consumption.

Linked to the above are issues associated with the row labelled “alternative feed resources”, where Bellona, despite the threat addressed with regard to harvesting krill, sees the harvesting of marine resources on lower trophic levels as a possible alternative. This is because any growth in global production in fish farming has to be based on sources of feed other than fishmeal and fish oil from the traditional forage fisheries. More drastic is the recommendation given by FIVH to make aquaculture less resource-intensive and environmentally damaging by concentrating on aquatic plants and herbivore species.
Lastly, in connection with the row labelled “climate change and fossil energy”, the environmental group says that it is more environmentally friendly to produce food close to where people live, since this reduces transportation and thus the use of fossil energy.

The environmental group – *column for threats currently caused by other activities and agendas*

Threats from other kinds of activities and agendas mentioned by the environmental group are related to issues sorted under the labels “pollution”, “area use”, “salmon overfishing”, “forage fisheries and overfishing”, “fishmeal and fish oil for fish feed production”, and “climate change and fossil energy”.

WWF is specifically concerned about threats to wild Atlantic salmon populations due to overfishing of wild salmon, hydropower dams, other man-made river obstructions and pollution from industry, urban settlements and agriculture. Friends of the Earth is worried about the overexploitation of wild fish resources in general, just as much as they are for the fisheries related to raw materials for fish feed production. They also address the more general pollution problems linked to industry, agriculture, transportations and public consumption, and hold furthermore that the Norwegian energy consumption should be reduced considerably. Bellona addresses the problem of environmental toxins such as heavy metals, PCBs and dioxins, which accumulate in the marine food chain. The production of genetically modified plants which are used for fish feed also represents a threat that is initially caused by other activities and agendas that salmon farming.

Similar to the statement that the salmon farming industry should avoid raw materials that might be used for human consumption, FIVH says furthermore that also meat and milk production is based on raw materials useful as food for humans. Relevant also in this connection is Bellona’s contention that the poor would be happy to eat fishmeal, but because they have less purchasing power, the world market entails that the meal is sold to the feed industry in the Western world. The trend is that more and more of the world's fishmeal and oil are used in aquaculture. To illustrate how the world market works, Bellona says that should a global food shortage occur that hits more than just the poorest, the higher demand for food will yield higher production of food based on what we currently use as feed. Unless, therefore, we want to introduce a new economic world order, they say further, little can be done with the
fundamental mechanisms in the market. Through development aid, reduction of various trade barriers and debt relief, however, the imbalances can be evened out.

Finally, Bellona mentions two more kinds of threats from other activities and agendas than salmon farming. The first threat, which might be associated with the row labelled “forage fisheries and overfishing”, is that the global discarding of fish has been estimated to be 27 million tones, which is almost as much as is used for fishmeal and fish oil production. In Norway, the authorities have adopted a zero discard policy, where it is illegal for commercial fishermen to throw back any of the catch to the sea. The second, which might be associated with the row labelled “area use” and probably also with the “forage fisheries and overfishing” row, is that a complete alternation of the ecosystems has been accepted on land. Cultivated land has displaced wilderness, livestock have displaced wild grazing animals and wild predators have been exterminated to protect livestock. Bellona asks then if the cod should be exterminated to protect more productive species lower down the food chain. Their own answer is that they do not think so.

6.3 The animal welfare group – NSPA, NOAH, Debio

The answers of the three animal welfare organisations (NSPA, NOAH and Debio) are given together for each question. It is noted which of the three organisations the different answers refer to.

6.3.1 NSPA, NOAH, Debio – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

NSPA has the following ‘[o]bjectives:

- to spread knowledge about the importance of animal welfare
- to influence attitudes towards animals among the general public
- to be a consultant for the government and others, with regard to animal related issues
- to take part in international animal welfare projects
- to undertake practical animal welfare work’ (NSPA 2006).
‘NOAH’s vision is a world where animals are not locked in for the sake of their fur, mistreated for the sake of research, ridiculed for the sake of entertainment or killed for the sake of meat’ (NOAH 2006a translated).

NOAH always supports the animals’ interests and does not accept any compromises at their expense. NOAH works against all kinds of utilisation of animals because it sees that animals:

- ‘wish to live; and should therefore not be killed’,
- ‘wish to flourish; and therefore can demand freedom’,
- ‘wish to seek joy in life; and therefore can demand the fulfilment of their flourishing potentials’,
- ‘are not there for humans to utilise them’,
- ‘are born to live their own lives’ (NOAH 2006b).

‘Debio’s goal is to safeguard and promote organic production, marketing and consumption’ (Debio 2006). Debio also aims ‘to contribute to integrating the entire scope of organic activities. Debio wishes to create trust and to achieve general acceptance of environmentally, socially and economically sustainable production systems based on the philosophy of organic production’ (ibid.).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

NSPA (Lazzeri 1999) is concerned about the question of whether fish might be able to suffer, while NOAH (2006b) states that animals avoid pain and are born to live their own lives. Debio (2005) addresses animal welfare as a central part of organic aquaculture.

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

NSPA (Jakobsen 2001, Malmstøm 2000) emphasises the salmon farmers’ responsibility to care for the full lifelong welfare of the more than 100 million salmon in the fish pens, which is a far greater number of individuals than the livestock in traditional agriculture. They are critical to the oxygen content in juvenile tanks, the vaccination techniques, deformities of the skeleton and abdomen, fish density in pens, the use of light by the pens to increase the growth
rate, starvation as a production-regulating process, conditions under fish transportation and
the slaughtering process

NOAH (Martinsen 2002) is concerned about the well-being of the fish when stocked in pens. In addition to the questions about diseases, medicine use and salmon lice, NOAH asks about the oxygen content in the water, stress due to the shoaling behaviour the salmon need to adapt to, aggression between the fishes, reduced possibilities for their normal elastic swimming activities, compulsory smoltification, skeleton and viscera deformation and other physical defects, stressful handling when sorted and pain in connection with the slaughtering process.

Debio (2005 p.12) holds that ‘[o]rganisms that […] not can be inspected after the usual procedure for organic production, including wild living fishes, cannot be included by the idea “certified organic aquaculture”. […]’.

4) What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?

The practical issues related to production, addressed by NSPA and NOAH under question 3, represent areas where salmon farming should take actions for improvements.

Among ‘[t]he most important aims of organic aquaculture production’ Debio (Debio 2005 p.7) mentions the following two activities specific to animal welfare:
- ‘Consider the wider social and ecological impact of the organic production and processing system’
- ‘Make an environment that favours the organisms’ natural behaviours and demands’.

Related to health and animal welfare, Debio (ibid. p.27) says furthermore that ‘[w]hen adjusting the stock density, consideration must be given to [the following]:
- The fish must have a low aggression level and low frequency of fin biting / damage
- That the fish can form shoals
- That the optimal behaviour of the fish is maintained
- That the fish density does not cause behaviour indicating stress
- The oxygen content in the water’.
5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?

Nothing is specifically mentioned about threats from other activities and agendas, but the animal welfare and organic production issues, as the animal welfare group presents them in the answers given to question 1, represent general challenges in all kinds of relations between humans and animals.

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?

NSPA admits that there has been progress in the welfare of farmed salmon in Norway, though this has been achieved in areas where improvements in animal welfare also improve the economy. They mention areas such as the reduction in deceases by vaccination, hygiene measures, better treatment against salmon lice and intestinal worms, and better feed and better feeding routines (Jakobsen 2001).

6.3.2 Results from the examination of the animal welfare group – values and threats

Also for the animal welfare group there is one subsection presenting the results from the answers to questions 1, 2 and 6 and one subsection presenting the results from questions 3, 4 and 5.

The animal welfare group – flourishing matrix

As indicated by the name of this group and shown by the answers to question 1, their primary interest is animal well-being and welfare combined with the organic production philosophy of Debio. Some of the notions demonstrating this are that animals should not be killed because they wish to live, that animals can demand freedom because they wish to flourish, that they should fulfil their flourishing potentials and that they are born to live their own lives. I have therefore found it reasonable, as shown in the flourishing matrix of mind photo 6.5, to say that the animal welfare group in the context of the examination is concerned about the values behind both the wild and the farmed salmon.
Distinctive for the animal welfare group is that they only are concerned about the life values of the life domain. Values behind salmon within the biological and cultural domain as a source for food, income or adventure have no relevance for the animal welfare group.

**Life domain – life values**

The main focus is on the well-being and welfare of animals. The capacity to suffer and the disposition to avoid pain are used as arguments for why it is important to protect animals such as salmon. This points towards Singer’s and Regan’s environmental ethics, and the hedonistic nature-environmental ethics, as presented in Chapter 5 (Conceptual model – a primary goal). The statement that animals are born to live their own lives gives furthermore association to Goodpaster’s and Taylor’s life-centred environmental ethics. So does the statement that animals wish to seek joy in life, and therefore can demand the fulfilment of their flourishing potentials. Adding then Debio’s aim of integrating the entire scope of organic activities, it might be said that that the animal welfare group tends towards a kind of proper nature-environmental ethics.
This indicates, as I see it, that the animal welfare group might regard sentience and perhaps also being alive as possible value-conferring properties for ascribing a direct moral status value to wild and farmed salmon. On this basis I find that the terms “animal welfare” and “life of their own” are suitable candidates for describing the life value behind both wild and farmed salmon, seen from the perspective of the animal welfare group.

Positive effects of farmed salmon – question 6
The comment that there has been progress in the welfare of farmed salmon in Norway indicates that the salmon farming industry at least to some extent might agree with the animal welfare group on the animal welfare part of the life value behind farmed salmon.

The animal welfare group – threats to values behind biodiversity
The main issues addressed in the answers of the animal welfare group to questions 3, 4 and 5 are, as shown in mind photo 6.6, related only to fish diseases and the handling of farmed salmon.

The animal welfare group – column for threats caused by salmon farming
The threats from salmon farming referred to in the answers of the animal welfare group focus on the farmed salmon. Such threats are the oxygen content in juvenile tanks, vaccination techniques, deformities, fish density, light by the pens, starvation as a production-regulating process, fish transportation, the slaughtering process, stress due to shoaling behaviour, aggression between the fishes, compulsory smoltification and stressful handling when sorted. These are all issues associated with the rows in mind photo 6.6 labelled “fish diseases” and “handling of farmed salmon”.

Another issue associated with the row labelled “handling of farmed salmon” is Debio’s concern for environments that favours the organisms’ natural behaviour and demands. This is especially in connection with their statement that organisms which cannot be inspected after the usual procedure for organic production cannot be included by the idea of certified organic aquaculture.
### Mind photo 6.6 Overview of threats to values behind biodiversity – *animal welfare group*

<table>
<thead>
<tr>
<th>- threats to values behind biodiversity from the perspective of the animal welfare group</th>
<th>- threats for possible practical handling in relation to the ethical challenges of the salmon farming industry</th>
<th>- threats out of control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escapes incl. genetic and biological interactions</td>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats caused by other activities and agendas (question 5)</td>
</tr>
<tr>
<td>Salmon lice</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
<td></td>
</tr>
<tr>
<td>Fish diseases</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Area use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling of farmed salmon</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon overfishing</td>
<td>(X)</td>
<td></td>
</tr>
<tr>
<td>Forage fisheries and overfishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishmeal and fish oil production</td>
<td></td>
<td></td>
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<tr>
<td>Alternative feed resources</td>
<td></td>
<td></td>
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<tr>
<td>Climate change and fossil energy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The animal welfare group – *column for threats that should be handled by the salmon farming industry*

More or less all the issues mentioned in relation to question 3 are practical, production-related issues that the animal welfare group emphasises that the Norwegian salmon farming industry should handle. I have therefore marked the rows labelled “fish diseases” and “handling of farmed salmon” in the second column about threats that should be handled by the salmon farming industry. Part of this is also the emphasised need to create an environment that favours the organisms’ natural behaviour and demands, which includes adjustments of fish density.
The animal welfare group – column for threats currently caused by other activities and agendas

Though nothing is specifically mentioned in the examination about threats from other activities and agendas, the issues of animal welfare and organic production, such as the animal welfare group presents them, represent general challenges in all kinds of relations between humans and animals. The row labelled “handling of farmed salmon” is therefore marked in brackets in the third column about threats caused by activities and agendas other than farmed salmon.

6.4 The scientific group – Naylor et al.

Except for one supplement reference to Pauly et al. (2002) all the answers given to questions 1 to 6 in the following refer to the article Effect of aquaculture on world fish supplies (Naylor et al. 2000). Therefore only page numbers are given when referring to this publication, which is written by a group of 10 scientists.

6.4.1 Naylor et al. – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

‘Global production of farmed fish and shellfish has more than doubled in the past 15 years. Many people believe that such growth relieves pressure on ocean fisheries, but the opposite is true for some types of aquaculture. Farming carnivorous species requires large inputs of wild fish for feed. Some aquaculture systems also reduce wild fish supplies through habitat modification, wild seedstock collection and other ecological impacts. On balance, global aquaculture production still adds to world fish supplies; however, if the growing aquaculture industry is to sustain its contribution to world fish supplies, it must reduce wild fish inputs in feed and adopt more ecologically sound management practices’ (p.1017).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

‘Many people believe that aquaculture production will compensate for the shortfall in ocean harvests as ocean fisheries deteriorate, or that fish farming will restore wild populations by relieving pressure on capture fisheries. We conclude that the compensation argument is
correct for some aquaculture practices but unfounded for others. […] We do not find evidence that supports the restoration argument. As aquaculture production continues to increase and intensify, both its reliance and its impact on ocean fisheries are likely to expand even further. The balance between farmed and wild-caught fish, as well as the total supply of fish available for human consumption, will depend on future aquaculture practices. […] We argue that farming can contribute to global (net) fish supplies only if current trends in fishmeal and fish oil use for aquaculture are reversed and policies are enforced to protect coastal areas from environmental degradation’ (p.1017).

‘Regardless of the exact efficiency ratio used, […], the growing aquaculture industry cannot continue to rely on finite stocks of wild-caught fish, a number of which are already classified as fully exploited, overexploited or depleted. Taking efficiency arguments to their logical conclusion – that ever increasing amounts of small pelagic fish should be caught for use in aquaculture feeds to expand the total supply of commercially valuable fish – would clearly be disastrous for marine ecosystems. Such an approach would also severely constrain the long-term growth of the aquaculture industry itself’ (p.1019).

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

‘The worldwide decline of ocean fisheries stocks has provided impetus for rapid growth in fish and shellfish farming […]. For some types of aquaculture activity, including shrimp and salmon farming, potential damage to ocean and coastal resources through habitat destruction, waste disposal, exotic species and pathogen invasions, and large fish meal and fish oil requirements may further deplete wild fisheries stocks. For other aquaculture species, such as carp and molluscs, which are herbivorous or filter feeders, the net contribution to global fish supplies and food security is great. The diversity of production systems leads to an underlying paradox: aquaculture is a possible solution, but also a contributing factor, to the collapse of fisheries stocks worldwide’ (p.1017).

Fishing down and farming up the food web:

‘Capture fisheries landings as a whole have plateaued at around 85-95 Mt (million metric tonnes, or megatonnes) per year. Moreover, there has been a gradual shift in wild fish capture from large and valuable carnivorous species to smaller, less valuable species that feed at lower trophic levels. Although catch rates for some species have not declined during the 1990s, most
ocean fisheries stocks are now recognized as over or fully fished. Aquaculture production, meanwhile, has surged, particularly during the past 10-15 years. Farmed fish supplies totalled 29 Mt in 1997, compared with 10 Mt a decade ago. Such growth helps to explain current patterns in ocean fish capture; between 1986 and 1997, 4 of the top 5, and 8 of the top 20 capture species were used in feed production for the aquaculture and livestock industries. These species – anchoveta, Chilean jack mackerel, Atlantic herring, chub mackerel, Japanese anchovy, round sardinella, Atlantic mackerel and European anchovy – are all small pelagic fishes. Many intensive and semi-intensive aquaculture systems use 2-5 times more fish protein, in the form of fish meal, to feed the farmed species than is supplied by the farmed product. In contrast, extensive and traditional systems use little or no fish meal, although nutrient-rich materials are often added to the water to stimulate growth of algae and other organisms on which the fish feed’ (p.1018).

‘Because of the high levels of fish meal and fish oil in aquaculture feeds, many species require more fish biomass as inputs than the farmed fish produced. For the ten types of fish most commonly farmed, an average of 1.9 kg of wild fish is required for every kilogram of fish raised on compound feeds […]. Only three of the ten types of fish – catfish, milkfish and carp – require less fish as inputs than is ultimately harvested. (Marine molluscs and many filter-feeding carp are not fed compound feeds at all.) In contrast, carnivorous species require 2.5-5 times as much fish biomass as feed as is produced. […] Although aquaculture has the fastest growing demand for fish meal and fish oil, fish are not the only animals fed diets containing fish meal. The poultry and swine industries are the world's largest consumers of fish meal. The proportion of fish meal in aquaculture feeds is, however, much higher than in poultry and livestock feeds, which on average contain only 2-3 % fish meal as a protein supplement. The production of a kilogram of pork or poultry typically uses large amounts of plant proteins, but only a few hundred grams of fish, whereas production of a kilogram of carnivorous fish can use up to 5 kg of wild fish. […] The relative feed efficiency of fish farming is a complex subject that has not yet been fully analysed’ (p.1019).

Appropriation to net aquatic primary production:
‘Global capture fisheries (plus aquatic plants) remove 123 Mt from the sea and lakes, of which 27 Mt is directly discarded as bycatch. Capture fisheries landings (excluding discarded bycatch) amount to 96 Mt, of which 65 Mt of whole fish and 1 Mt of seaweeds are consumed by humans. The remaining 30 Mt of fish catch plus another 2 Mt of processing scraps from
aquaculture and fisheries are used for fish meal production. The fish meal industry has proposed that fishing vessels be encouraged to retain bycatch, now discarded, for sale to producers of fish meal and fish oil. Sale of bycatch could prove undesirable, however, if it undermines efforts to reduce bycatch rates or decreases in situ recycling of bycatch. One-third of the fish used to make fish meal inputs, ~10 Mt, is converted to aquaculture feeds. The remaining two-thirds of the fish, ~22 Mt, is used to make fish meal for chicken, pig and other animal feeds, although the share of aquaculture continues to increase. The proportion of fish meal supplies used for farming fish rose from 10 % in 1988 to 17 % in 1994 and 33 % in 1997’ (p.1019).

‘Total aquaculture production of finfish, crustaceans and molluscs amounts to 29 Mt (plus 8 Mt of farmed seaweeds). However, the net volume of fish flowing to human consumption through aquaculture is at maximum 19 Mt after ocean fisheries capture for fish feeds is subtracted. The appropriation of aquatic productivity for fish feeds reduces supplies of wild fish that could potentially be consumed directly. In Southeast Asia, for example, small pelagic fishes, such as mackerel, anchovy and sardines, provide an important protein source for people. Although some fish used for fishmeal and fish oil, such as menhaden, are distasteful to humans, the demand for small pelagic fish for direct human consumption is likely to increase with population growth in the developing world’ (p.1019-1020).

Food web interactions:
‘Many small pelagic fisheries exploited for feed are over-fished and are strained by climatic variability associated with El Niño Southern Oscillation events. The impact of pelagic fisheries depletion is thought to reduce available food supplies for marine predators, including valuable species consumed by humans. In the North Sea, for example, over-exploitation of many capelin, sand eel and Norway pout stocks, mainly for reduction to fishmeal, has been implicated in the declines of certain stocks of other wild fish such as cod, and changes in the distribution, population sizes and reproductive success of various seal and seabird colonies. Similarly, a strong interaction between anchoveta and sea bird and mammal populations has been well documented for the Peruvian upwelling system’ (p.1021). Part of this Pauly et al. (2002 p.689-690) adds, is that ‘[e]verywhere that industrial-scale fishing […] has been introduced, it competes with small-scale or artisanal fisheries’. ‘This is especially true’, they say further, ‘for tropical shallow waters […], where artisanal fisheries targeting food for local consumption and trawlers […], compete for the same fish’.

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Introduction of non-indigenous organisms:

‘In some cases, aquaculture affects stocks of wild and farmed fish through biological pollution. Atlantic salmon – the dominant salmon species farmed – frequently escape from net pens. As much as 40% of Atlantic salmon caught by fishermen in areas of the North Atlantic Ocean is of farmed origin. In the North Pacific Ocean, over 255,000 Atlantic salmon have reportedly escaped since the early 1980s and are caught by fishing vessels from Washington to Alaska. Increasing evidence suggests that farm escapees may hybridize with and alter the genetic makeup of wild populations of Atlantic salmon which are genetically adapted to their natal spawning grounds. Such genetic alterations could exacerbate the decline in many locally endangered populations of wild Atlantic salmon. Movement of stocks for aquaculture purposes can also increase the risk of spreading pathogens. The relationships between farmed and wild fish and disease transfer are complex and often difficult to disentangle. In Europe, however, serious epidemics of furunculosis and *Gyrodactylus salaris* in stocks of Atlantic salmon have been linked to movements of fish for aquaculture and re-stocking’ (p.1021).

Effluent discharge:

‘Untreated wastewater laden with uneaten feed and fish faeces may contribute to nutrient pollution near coastal ponds and cages. Pollution problems are most severe in shallow or confined water bodies; they also tend to be serious in regions where intensive aquaculture systems are concentrated. In many such areas, sedimentation of food particles and faecal pellets under and around fish pens and cages negatively affects the biogeochemistry of benthic communities. Moreover, nitrogen wastes (for example, ammonia and nitrite) that exceed the assimilative capacity of receiving waters lead to deterioration in water quality that is toxic to fish and shrimp. Problems of effluent discharge from aquaculture have been widely discussed, but management options for altering nitrogen biogeochemistry are based mostly on controlling the intensity of fish production in monoculture and polyculture systems. Aquaculturists have a stake in regulating nutrient pollution, because poor water quality and high stocking densities often promote outbreaks of pathogens and subsequent declines in farm productivity’ (p.1021).
4) *What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?*

‘The evidence presented above shows that total world aquaculture production currently adds to net global fish supplies, although many types of aquaculture result in a net loss of fish. Aquaculture's potential contribution to fish supplies is severely diminished by rapid growth in production of species fed carnivorous diets and by aquaculture practices that lead to coastal habitat destruction, biological pollution and discharge of untreated effluents. Continued expansion of aquaculture will require healthy coastal and freshwater ecosystems. Without clear recognition of the industry's dependence on natural ecosystems, it is unlikely that aquaculture will develop to its full potential or will continue to supplement ocean fisheries. We therefore suggest that the aquaculture industry prioritizes the following four chief goals: (1) expansion of the farming of low trophic level fish; (2) reduction of fish meal and fish oil inputs in feed; (3) development of integrated farming systems; and (4) promotion of environmentally sound aquaculture practices and resource management’ (p.1021).

Because over-exploitation of pelagic fisheries has negative ecological and social consequences, developing a strategy to replace fish meal and fish oil in feeds should become both a private and public-sector priority’ (p.1022).

5) *Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?*

Nothing is mentioned by the scientific group.

6) *What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?*

‘Some aquaculture proponents argue that even if farmed fish production requires more wild fish biomass than is ultimately harvested, it is still more efficient than the production of commercially valuable carnivorous species in the wild. Assuming a canonical value of a 10 % energy flow between trophic levels, producing 1 unit of predatory fish requires 10 units of food (largely small pelagic fish) compared with 2-5 units to produce a unit of farmed fish. This comparison is subject to debate, because energy flows between marine fish at different trophic levels are not well documented. Nevertheless, such efficiency comparisons bolster the logic for using some small pelagic fish in fish feeds’ (p.1019).
6.4.2 Results from the examination of the scientific group – values and threats

As for the other groups, the results of the last of the four prosecutor groups are presented in one subsection with results of the answers to questions 1, 2 and 6, and one with the result of the answers to the questions 3, 4 and 5.

The scientific group – flourishing matrix

The scientific group focuses entirely on fish resources as food supply. Their main concern is whether or not aquaculture contributes to world fish supplies. In the context of the examination this means, as noted in the heading of the flourishing matrix in mind photo 6.7, that the primary interest of the scientific group is on commercial wild fish stocks, which includes fish resources utilised in local small-scale artisanal fisheries. Farmed salmon is again added in the heading because of question 6 about positive effects of salmon farming, but this time also because the primary interest of the scientific group to see whether or not aquaculture contributes to world fish supplies.

Mind photo 6.7 Flourishing matrix – scientific group

<table>
<thead>
<tr>
<th>Values behind biodiversity</th>
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</thead>
<tbody>
<tr>
<td>Types</td>
</tr>
<tr>
<td>Life domain</td>
</tr>
<tr>
<td>Life values</td>
</tr>
<tr>
<td>Necessary life support food sources</td>
</tr>
<tr>
<td>Purely instrumental economic values</td>
</tr>
<tr>
<td>Recreational values</td>
</tr>
<tr>
<td>Aesthetic values</td>
</tr>
<tr>
<td>Scientific values</td>
</tr>
<tr>
<td>Evolutionary values</td>
</tr>
<tr>
<td>Symbolic values</td>
</tr>
<tr>
<td>Religious values</td>
</tr>
</tbody>
</table>
The primary interest of the scientific group entails that the focus is limited to the life support values within the biological domain only.

**Biological domain – necessary life support food sources**
The clear message from the scientific group is that farming can contribute to global net fish supplies only if current trends in fishmeal and fish oil use for aquaculture are reversed. They say further that the growing aquaculture industry cannot continue to rely on finite stocks of wild-caught fish, a number of which are already classified as fully exploited, overexploited or depleted. They conclude that such an approach would severely constrain the long-term growth of the aquaculture industry itself.

Since the scientific group thereby seems to focus on fish as a resource to secure optimal delivery of food for humans, I have found that “local and global food security” is the best way to describe the necessary life support food sources value behind these resources. As shown in mind photo 6.7, this certainly holds true for commercial wild fish stocks. For farmed salmon this is noted in brackets because it depends on the salmon farming industry’s ability to reverse the current trends in the use of fishmeal and fish oil.

**Positive effects of farmed salmon – question 6**
The scientific group refers to calculations showing that salmon farming production can be more efficient than commercially carnivorous species in the wild. Though they hold that such an efficiency comparison is subject to debate, they conclude that it bolsters or supports the logic for using some small pelagic fish in fish feeds. I have therefore added “efficient resource utilisation” in brackets to the description in the flourishing matrix of the necessary life support value of farmed salmon.

**The scientific group – threats to values behind biodiversity**
The main issues addressed in the answers of the scientific group to questions 3, 4 and 5 are, as shown in mind photo 6.8, limited primarily to fishmeal and fish oil production, and forage fisheries and overfishing.

**The scientific group – column for threats caused by salmon farming**
The scientific group addresses threats such as the depletion of wild fisheries stock due to large fishmeal and fish oil requirements, and the gradual shift in wild fish capture to smaller, less
valuable species that feed at lower trophic levels. The general picture they describe is that of
the global 123 Mt fisheries capture, 27 Mt is directly discarded as bycatch, 65 Mt is whole
fish and 30 Mt is used for fishmeal production. One-third of the fishmeal, 10 Mt, is converted
to aquaculture feeds. The remaining two-thirds are used to make fishmeal for chicken, pig and
other animal feeds, although the share of aquaculture continues to increase. Total aquaculture
production of finfish, crustaceans and molluscs amounts to 29 Mt. However, the net volume
of this that flows to human consumption is at maximum 19 Mt after ocean fisheries capture
for fish feeds is subtracted.

**Mind photo 6.8 Overview of threats to values behind biodiversity – scientific group**

<table>
<thead>
<tr>
<th>Overview of threats to values behind biodiversity – scientific group</th>
<th>- threats for possible practical handling in relation to the ethical challenges of the salmon farming industry</th>
<th>- threats out of control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>- threats to values behind biodiversity from the perspective of the scientific group</td>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
</tr>
<tr>
<td>Escapes incl. genetic and biological interactions</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Salmon lice</td>
<td></td>
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<tr>
<td>Fish diseases</td>
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<tr>
<td>Pollution</td>
<td>X</td>
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<td>Area use</td>
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<tr>
<td>Handling of farmed salmon</td>
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<tr>
<td>Salmon overfishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forage fisheries and overfishing</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fishmeal and fish oil for fish feed production</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternative feed resources</td>
<td></td>
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<tr>
<td>Climate change and fossil energy</td>
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</tbody>
</table>

The explanation of this is that intensive and semi-intensive aquaculture systems use 2-5 times
more fish protein than is supplied, and that an average of 1.9 kg of wild fish is required for
every kilogram produced of commonly farmed fish. The scientific group says further that
carnivorous species in general require 2.5-5 times as much fish biomass as feed as is
produced, and that production of a kilogram of carnivorous fish can use up to 5 kg of wild fish. They hold in addition that fish feeds reduce supplies of wild fish that could potentially be consumed directly, and that demand for small pelagic fish for direct human consumption is likely to increase with population growth in the developing world. Pelagic fisheries are also thought to reduce available food supplies for other fish species consumed by humans. Included in this is, as I read it, the risk of negatively affecting the artisanal fisheries in the developing countries.

On this basis, I have marked the rows of mind photo 6.8 labelled “forage fisheries and overfishing” and “fishmeal and fish oil for fish feed production” to show that the scientific group perceives these issues to represent threats to the values behind commercial wild fish stocks caused by salmon farming.

Additionally, since the scientific group mentioned biological pollution caused by farm escapees and nutrient pollution, I have marked the rows in mind photo 6.8 labelled “escapes” and “pollution”.

The scientific group – column for threats that should be handled by the salmon farming industry
With regard to actions to reduce or eliminate threats, the scientific group mentions that there should be an expansion of the farming of low trophic level fish, and a reduction of fishmeal and fish oil inputs in feed. By recommending farming down the food web they state that fish species fed on herbivorous diets provide most of the 19 Mt gain in fish supplies from aquaculture.

As a means to reduce use of fishmeal and fish oil, and thus also the fishing pressure on forage fish stocks, the scientific group recommends the use of substitutes. They mention oilseeds, meat byproducts and microbial proteins as substitute feed ingredients, but add that the complete replacement of fishmeal and fish oil in aquaculture feeds faces severe barriers.

I have therefore marked the rows in mind photo 6.8 labelled “forage fisheries and overfishing” and “fishmeal and fish oil for fish feed production” as issues that the scientific group emphasises should be handled by the salmon farming industry.
6.5 The salmon farming group – FHL, supporters

A great deal of the Norwegian fish farmers are organised in The Norwegian Seafood Federation (FHL), which represents the interests of approximately 600 member companies and 9000 employees. FHL covers the entire value chain from fjord to dinner table in the fisheries and aquaculture sectors in Norway and consists of the following branch associations:

- FHL fishmeal
- FHL finfish feed
- FHL aquaculture
- FHL industry and export
- FHL Marine – biomarine ingredient industry (FHL 2007a)

FHL has developed a document in Norwegian with joint goals in the field of the environment for all five branches. This document, *Felles miljømål for norsk fiskeri- og havbruksnæring* (FHL 2003), is chosen as the main input to answer questions 1 to 6. When referring to this document, only page numbers are given.

6.5.1 FHL, supporters – questions 1 to 6

1) What are your primary interests in relation to ecological entities?

FHL states that ‘Norway is uniquely blessed with a long and fertile coastline. The sea’s abundant resources have laid the foundation for sustaining active coastal communities combining innovation with traditional culture, which allows our businesses to deliver such a range of seafood to all four corners of the world. The fisheries and aquaculture industry is Norway’s largest export industry after oil and gas – and it’s the capable users of resources along the Norwegian coast that have made this all possible. Norway’s seafood industry is also bound to have a tremendous impact in the future. FHL strives to ensure that the natural authorities bear this in mind when determining national priorities’ (FHL 2007a).
Two main objectives are addressed as the most important for managing the Norwegian fisheries and fish farming industry. These are sustainable management of the marine ecosystem and that a clean environment is absolutely necessary for production of safe food (p.2). The goal is that the Norwegian fisheries and fish farming industries should be driven by principles of sustainable management, and that Norwegian seafood should be safe to eat. The strategy to achieve this is to develop measures to control the fish stock status, resource harvesting, effluents and other kinds of impacts on the environment that might be caused by the industry itself. In addition it is necessary with monitoring and surveillance of the marine environment (p.3).

2) Why is it important to protect or conserve ecological entities affected by salmon farming-related activities and agendas?

Since farmed salmon is after all the ecological entity of primary interest for the salmon farming group, question 2 logically is answered by the comments given to question 1. In short these comments say that it is important to protect or conserve the ecological entities affected by salmon farming-related activities because these entities represent the resources that have laid the foundation for the Norwegian salmon farming industry. Protection and conservation are important because they secure sustainable management of the marine ecosystem and a clean environment for the production of safe food.

3) What negative impacts do salmon farming-related activities and agendas have on ecological entities?

FHL has described six sub-goals concerning sustainable management and six sub-goals concerning the pollution of the marine environment. These sub-goals are used in the answers to questions 3, 4 and 5. For the answers to question 3 it is important to be aware that the sub-goals do not explicitly address negative impacts. They instead focus on solutions to challenges, and by that indirectly address negative impacts. This should be kept in mind when reading the answers to question 3. Five of the sustainable management sub-goals and one of the pollution sub-goals are used for this purpose. Simultaneously these sub-goals serve as input to question 4, about what can be done by the Norwegian salmon farming industry to minimise the risks of negative impacts on the ecological entities. The other way around, six specific issues for improvements mentioned as answers to question 4 are also regarded as input to question 3.
The main reason for this intermingling of input to questions 3 and 4 is that the FHL has a consistently positive and proactive attitude in their presentation form. They aim at solutions instead of focusing explicitly on addressing or disclosing negative impacts and threats.

It should be recalled that though the primary interest of the salmon farming group is the farmed salmon, they also have indirect interest in the values behind the three other ecological entities. This is what is addressed in the following.

The five sustainable management sub-goals:
1. In relation to ‘sustainable harvesting of fish, which should be in accordance with national and international sustainable management’ (p.3 translated) the industry should do the following:
   • ‘Contribute to enforcing the efforts to develop and improve management models’ (p.3 translated).

2. In order to ‘reduce the emissions to air from fish farming and transportation of fish and fish products of fish’ (p.4 translated) the industry should do the following:
   • ‘Contribute to increased R&D efforts to find alternative energy sources and increase the efficiency of existing methods.
   • Contribute to the development of more energy-efficient transportation of Norwegian fish and fish products, and stimulate the implementation of this’ (p.4 translated).

3. In order to ‘reduce the fish farming industry’s negative impacts on ecosystems and forms of nature’ (p.4 translated) the industry should do the following:
   • ‘Contribute with surveys about negative impacts and the development and implementation of cost-effective corrective measures.
   • Work to avoid escapes, and limit spread of diseases from fish farming to wild fish, in accordance with sustainable production.
   • Support companies to use environmental standards as a basis for their business.
   • Choose environmentally friendly materials and increase recirculation.

34 The focus on combating salmon lice is especially strengthened in 2007 (FHL 2007b)
• Choose solutions that give the best possible visual impressions (good aesthetics)’ (p.4 translated).

4. In order to ‘prevent unwanted impacts and interest conflicts’, (p.4 translated) the industry should do the following:
• ‘Use coastal zone planning as a tool for balancing interests and reducing interest conflicts between use and protection.
• Encourage good and open processes in public planning regarding fisheries and fish farming in the coastal zone, including protected areas.
• Contribute to increased awareness and education about negative effects as well as alternative methods for fisheries and fish farming.
• Contribute to find and map vulnerable nature areas’ (p.4 translated).

5. In order to ‘secure a strong professional management of fisheries and fish farming to be able to balance industry activities and protection’ (p.4 translated) the industry should do the following:
• ‘The organisations will contribute to a public administration with necessary enforcement to be able to take care of fisheries and fish farming interests, based on sustainable management of marine resources and the marine environment.
• Be a driving force in the work for effective and simple rules and regulations.
• Influence the development towards more effective control’ (p.4 translated).

The pollution sub-goals:
1. In order to ‘reduce the fisheries and the fish farming industry’s use of toxic substances’ (p.5 translated) the industry should do the following:
• ‘Contribute to R&D efforts to find alternative substances and methods to limit fouling and disease treatment.
• Contribute to more use of environmentally friendly substances and methods’ (p.5 translated).
4) **What can be done by the salmon farming industry to minimise the risks of negative impacts on the ecological entities?**

In short, the sub-goals used to answer question 3 say that the Norwegian salmon farming industry works to secure the following: sustainable harvesting of fish by improved management models, reduce the emissions to air, find alternative energy sources, develop more energy effective transportation, reduce negative impacts on ecosystems, avoid escapes, limit spread of diseases including combating salmon lice, increase recirculation, use coastal zone planning, balance industry activities and protection and reduce the use of toxic substances.

In addition are the last sustainable management sub-goal and two of the pollution sub-goals mentioned in FHL (2003). The sustainable management sub-goal is ‘better utilisation of fish and bi-products’ (p.4 translated). To achieve this, the salmon farming industry should do the following:

- ‘Increase R&D efforts in the use and commercialising of bi-products.
- Increase efforts for further increasing the share of fish and bi-products that goes to consume’ (p.4 translated).

One of the pollution sub-goals is ‘development of effective coastal control and protection’ (p.6 translated). To achieve this, the salmon farming industry should do the following:

- ‘Demand that the Parliament and Government improves and increases the grants to the coastal control and protection.
- Contribute to the development and implementation of plans for crises handling.
- Demand the introduction and strong reinforcement of sailing corridors for ships.
- Work for strengthening the control and preparedness to handle acute discharge, so that the response times are the shortest possible.
- Contribute to securing that R&D efforts are directed towards the development of more effective equipment for control and protection, and that such equipment are used.
- Work for good surveillance and warning when huge amounts of toxic or damaging marine organisms appear’ (p.6 translated).
The other pollution sub-goal is ‘better documentation of, and communication about environmental conditions and production processes’ (p.6 translated). To achieve this the salmon farming industry should do the following:

- ‘Influence authorities to increase grants to better mapping and warning of toxic substances in the ocean areas.
- Make the information more transparent and accessible by help of modern information systems. Included here are
  - Contribute to establishing good tracing systems.
  - Motivate to a more effective utilisation of registrations from the companies’ internal control systems.
- Support and improve crises handling work’ (p.6 translated).

Finally are the six specific issues which by addressing potentials for improvements at the same time expose negative impacts, and thus input to question 3. These are about the status of medicine use, salmon lice, escapes, use of copper, nutrient loading, vegetable raw materials for feed and animal welfare, including fish density in pens and slaughtering methods.

**Medicine use:**

‘At the present time, salmon is Norway’s healthiest domestic animal. While every second Norwegian takes antibiotics in any given year, every fifth cow does so and every 250th salmon. The use of antibiotics has fallen by 97 % since 1990, even though production of salmon and trout has increased by 274 %’ (FHL 2005b p.6). The use of antibiotics peaked in 1987 when nearly 50 tonnes of antibiotics were consumed, whereas approximately 50,000 tonnes of salmon and trout were slaughtered that year. Seven years later the consumption of antibiotics had dropped to 1.4 tonnes while the volume of slaughtered salmon and trout surpassed 200.000 tonnes. Since then the consumption of antibiotics has stabilised at around 1 tonne per year, while the annual production of salmon and trout has increased to 588,000 tonnes slaughtered in 2005 (FHL 2005c).

**Salmon lice:**

‘Many farmers […] use wrasse or cleanerfish, which eat the lice off the salmon. Other methods of combating the lice are bathing the salmon or medicating their feed in their first year. After several years’ work by the Norwegian aquaculture industry, sea lice are now under
control. Since 1996 all farmers have documented the louse situation in their facilities [...]. For the Norwegian aquaculture industry it is important that lice from farmed fish do not threaten the stocks of wild salmon’ (FHL 2005b p.5). The efforts to develop a vaccine against salmon lice seem promising (FHL 2005d p.14).

Escapes:
The escapes in 2005 were approximately 700,000 individuals of farmed salmon and trout. This is unfortunately more that in 2003 and 2004. The main reason for the escapes in 2005 was technical failures on the farm installations. The industry emphasises the need of continuously working to reduce the escapes to an absolutely minimum. In relation to the legislation regarding technical demands for fish farms (NYTEK), a number of courses and information meetings have been arranged, and the industry has taken a proactive role in supporting authorities and research programmes in this field. Finally, it should be mentioned that a new escapes committee has been established and will deliver its rapport in 200635 (FHL 2005d p.14).

Use of copper:
A project has been established to find ways for how to reduce copper, which is used to prevent shellfish, algae and other organisms from fouling the fish nets. The project focuses both on obtaining information about the effects of using copper compounds as impregnating material, and on actions to be taken to reduce the use of copper and find alternatives to copper impregnation (FHL 2005e, KPMG 2000).

Nutrient loading:
The feed conversion rate in salmon farming was reduced by 50 % from the beginning in the 1970s to 2000. In the same period the discharge of nitrogen, and thus the nutrient load on the environment, was reduced by 80 %. In addition to these improvements, the fish farms are now moved to areas with a larger capacity for the decomposition and turnover of the organic discharge from the farms (EWOS 2003).

35 The report (FHL 2007c) was delivered at FHL’s annual meeting 12-13 April 2007. The Ministry of Fisheries and Coastal Affairs appointed a dedicated Commission on Escapes from Aquacultures on 05.07.2006. FHL participates with one representative in this Commission (FHL 2006d).
Vegetable raw materials for feed:
‘[Salmon] suffer no ill effects from replacing up to 75% of the dietary lipid (mainly from fish oil) with [vegetable rapeseed] oil. […] [A]s long as we meet the basic essential omega-3 fatty acid needs of the salmon with some dietary fish oil, such as those for EPA […] and DHA […], the fish can be reared successfully on these alternate diets. […] Using [rapeseed] oil instead of marine fish oil (e.g., anchovy oil) in fish feed will also reduce the accumulation of contaminants in salmon such as PCBs and dioxins that are present in wild marine fish’ (AOCS 2006).

Animal welfare:
The salmon farming industry believes that good fish health is good fish welfare. This has always been part of the industry’s agenda and part of the industries success. The industry participates actively in the development of rules and regulations and in the work with a new animal welfare bill. The focus on fish health is also shown through a number of research projects and action plans that are initiated (FHL 2005d p.14). One of the core issues is the slaughtering process. The authorities are working on revised slaughtering regulations, which will prohibit the current use of CO2 as an anaesthetic in the slaughtering process. FHL holds in this connection that it is important not to prohibit the use of CO2 before alternatives are available (Fiskeriforskning 2006, Moy 2006).

‘In August 1991 a special density limitation of 25 kg fish per m3 water volume in aquaculture pens was introduced. The reason was that the disease situation in the late 1980s made the authorities focus on fish density in aquaculture’ (MTB 2002 p.14 translated). Linked to this ‘[i]t should be noted that salmon are naturally shoaling, social animals and the densities on [the] farms mimic closely how the fish would behave in the wild. […] The behaviour the [salmon] exhibit in the farm situation is not significantly different from those exhibited in the wild. Animals which are reared in cruel or stressful situations usually enjoy poor health and do not grow or perform well’ (BIM 2005 p.1, 7).

‘[A] vaccine when the fish is small protects against six different diseases. Together with expertise in sickness prevention and good husbandry, vaccines have contributed to a formidable reduction in the use of medication in Norwegian aquaculture. Good water replacement is secured by means of correct placement of the facilities. All together, these
techniques have led to an excellent fish health and use of antibiotics is approaching zero. Norwegian salmon are now among the world’s healthiest domestic animals’ (FHL 2005b p.6).

5) Are there other human activities and agendas that have negative impacts on the same ecological entities as those affected by salmon farming-related activities and agendas?
The following three pollution-related sub-goals address impacts caused by other human activities. Besides addressing the threats, these three sub-goals, just as for the sub-goals used to answer question 3, might also work as answers to question 4, this time as input to what the salmon farming industry is doing to reduce any risks regarding the quality of farmed salmon and the safety of eating it.

1. In order to ‘achieve strong restrictions on toxic effluents and pollution of the marine environment from Norwegian and international activities’ (p.5 translated), the industry should do the following:
   • ‘Work for more stringent rules and regulations about effluents from Norwegian activities and less possibilities to get exemptions.
   • Encourage the authorities to have an offensive attitude in international work for reduction of pollution.
   • Encourage increased cleaning of old waste disposal sites and of sediments that leak toxic substances.
   • Work for stronger security demands, demands about effluents and environmental documentation’ (p.5 translated).

2. In order to ‘prevent radioactive pollution’ (p.5 translated), the industry should do the following:
   • ‘Seek international alliances to stop radioactive effluents from Sellafield, Le Hague and Majak.
   • Demand increased efforts from the authorities to reduce the risk for radioactive pollution nationally and internationally.
   • Work to stop plans for the establishment of storing and recirculation installations in Russia.
   • Work to prevent transportation of atomic waste through ocean areas along the Norwegian coast’ (p.5 translated).
3. In order to ‘contribute to limiting negative effects from oil industry and shipping’ (p.6 translated), the industry should do the following:

- ‘Work to establish zones where oil industry activities are prohibited, in order to protect important juvenile and ongrowing areas.
- Work for the demand of zero discharge from oil activities of substances that are potentially harmful to the environment.
- Contribute to establishing measures to avoid exotic organisms or infections that are imported and spread in Norwegian waters through ballast water.
- Work to prevent seismic shooting in fishing areas, juvenile areas and areas close to fish farms’ (p.6 translated).

Some additional comments are given with regard to PCBs and dioxins, oil spill and radioactive pollution, and GMO.

PCBs and dioxins:
Despite all the publicity about PCBs and dioxins in farmed salmon, the Norwegian Food Safety Authority (Mattilsynet) and the National Institute of Nutrition and Seafood Research (NIFES) have concluded from their investigations that the dioxin content of Norwegian farmed salmon is below the limits set by the EU Commission. They therefore both conclude that Norwegian salmon is safe to eat (FHL 2004a, FHL 2004b). If necessary it is possible to clean fishmeal and fish oil to the extent that 90 % of the dioxin and PCB content is removed (Fiskeriforskning 2005).

Oil spill and radioactive pollution:
In addition to the dioxin and PCB problems are oil spill and radioactive pollution threats caused by activities other than salmon farming. Trying to reduce the consequences of these problems the industry is working together with Bellona and WWF in a process to create awareness and support the authorities in the efforts to protect the Norwegian coastal waters against the different kinds of pollution (FHL 2006b).
GMO:
‘FHL is against the use of gene-modified species in aquaculture (fish, shellfish etc.). FHL will not participate in the development or use of gene-modified species in aquaculture.’ Due to the strict authority regulations, FHL is on the other hand, ‘positive to the use of plant products of gene-modified organisms for use in feed for aquaculture, based on the premises decided by the authorities. […] FHL finds it unproblematic to use products such as medicines, additives and others originating from gene-modified organisms, as long as these are used in closed industrial processes. […] One important premise is that there is full transparency and information about any use of gene-modified organisms or substances from such organisms, so that the consumers shall be able to make an independent assessment of their own and have real choices for their diet’ (FHL 2006c translated).

6) What positive effects with regard to the full range of value interests might follow from salmon farming-related activities and agendas?
As mentioned in Chapter 1 (Introduction – research area), the Norwegian salmon farming industry, by its remarkable growth over the relatively short period of 30 years, has grown from an annual production of Atlantic salmon from less than 10,000 tonnes in the pioneer period of the 1970s to 597,000 tonnes in 2006 (EFF 2006 p.11, FHL 2005a p.3). Most of this is exported worldwide. In 2005 64 % of the farmed salmon exported was sold in the EU, 11 % in Asia, 10 % in Russia and 14 % in the rest of the world (FHL 2005a p.4). Scenarios made for 2020 predict that the growth in the salmon production in Norway will most probably continue and that there are potentials for a two- or threefold increase (ECON 2002 p.55, 75, 89). The opportunities lay in the creation of work and income. In 2005 the export revenue of salmon farming was about 13.5 billion NOK, which comprised 5.2 per cent of Norway’s mainland export revenue that year, excluding oil and gas (FHL 2005a, SSB 2006). The fish farming industry of Norway, of which salmon farming represents about 90 %, employed directly approximately 2,600 man-years in 2004. The total of man-years which directly and indirectly depend on fish farming is estimated to be 19,500 (SINTEF 2005 p.18-19).

Efficiency in use of fishmeal and fish oil:
The salmon farming industry refers to studies about the utilisation of marine raw materials such as raw fish, fishmeal and fish oil done by Åsgård and Austreng (1995). They say that ‘[i]f raw fish, fishmeal and fish oil cannot be marketed for human consumption, further processing is required’. The background for their study is that about 30 % of the total fish
catch in the world is converted to fishmeal and fish oil (ibid. p.79). Large proportions of this fishmeal have been used for feed to poultry and pigs. In 1988 59 % of all fishmeal produced was used for poultry, 10 % for pigs, 20 % for aquaculture and 11 % for other (Barlow 2001 fig.9). In light of this, Åsgård and Austreng conducted their studies to see how poultry, pigs and salmon utilise the energy and proteins available in marine raw materials. The studies show (Åsgård and Austreng 1995 p.82) that for salmon the retention efficiency of digestible energy from the feed is 34 % and for protein the retention is 30 %. Comparably for poultry and pigs the retentions are respectively 17 and 20 % of the energy and 18 and 13 % of the protein. They read from this that with respect to both protein and energy retention, fish is much more efficient than other domesticated animals. Åsgård and Austreng conclude therefore that feed resources like fishmeal and fish oil are most efficiently utilised by fish (ibid. p.82-83).

Figures (Barlow 2001 fig.9) show that from 1988 to 2000 the proportion of fishmeal used for poultry production has decreased from 59 to 24 %, while the proportion used for aquaculture increased from 10 to 35 % and the proportion used for pig production increased from 20 to 29 %. Estimates for 2010 predict that the proportion of fishmeal to be used in aquaculture will increase further to 56 %, while the proportion for poultry will be down to a mere 12 %. So, from using more than half of the world’s fishmeal production in 1988, poultry production will probably use just a marginal part in 2010, while aquaculture will take the major share. For pig production there is little change.

For fish oil the situation is that in 1990 76 % of it was used to produce hardened edible fats (ibid. fig.10). This actually represented a destruction of the healthy fish oil rich in Omega-3 fatty acids, since it was transformed into unhealthy, but storable edible fats. The use of fish oil for aquaculture increased to 57 % in 2000, and for 2010 it is estimated that the aquaculture industry will use 98 % of the fish oil available on the market. The production of hardened edible fats on the basis of fish oil is predicted to be down to only 1 % in 2010. According to Åsgård and Austreng (1995 p.83), this development, together with the increased use of fishmeal in fish feed production and the general improvements in feed conversion efficiency in intensive fish farming, ‘clearly advocates fish farming as the future way of upgrading feed grade marine protein and oil for human consumption’.
Fishing down the food-web:
Åsgård and Austreng (1995 p.83) hold further that there is a potential for increasing the fish catch by harvesting at a lower trophic level, which is also known as fishing down the food web. This could for example entail harvesting capelin, which is food for cod, instead of harvesting cod itself. If we are unwilling to eat capelin, they say, then a relevant question is how much farmed salmon or wild cod can be produced from any given quantity of capelin. After performing such calculations, they (ibid. p.83-84) found that from 10 kg of raw capelin fish it is possible to produce 4.6 kg of farmed salmon, which gives 2.8 kg of edible salmon filet. From the same amount of capelin, wild cod may grow 2.0 kg, which gives 0.7 kg edible cod filet. If the energy content in the two of filets is compared, the difference is even greater. The salmon filet contains about 28 MJ of energy, while the cod filet contains about 3 MJ. Their (1995 p.79) conclusion therefore is that salmon in culture is more efficient than wild cod production. Skagen (1997) supports the idea that fishing down the food web to catch forage fish gives more protein yields than fishing of consume fish stocks.

In addition to this, Åsgård and Austreng (1995 p.85) refer to calculations showing that catching and processing fish for human consumption at higher trophic levels is more energy-intensive in terms of fossil energy than catching fishes on lower trophic levels and using them for fishmeal and fish oil production. The calculations show that a wild fish filet for human consumption only contains 4% of the energy spent on catching and processing the fish. Comparably fishmeal and fish oil contains 122% of what is spent in catching and processing the wild fish. When the fishmeal and fish oil are used to feed farmed fish or domesticated animals, 30-50% of the energy spent in the catching and further processing still remain in the end product.

‘Several scientific studies on the relationship between the markets for vegetable and marine protein sources have been carried out. The results clearly show that the marine raw material is part of the global protein and oil market […] So far, […] intensive fish farming has not led to greater pressure on wild fish stocks, thus causing environmental damage. For this reason, we have so far seen no signs indicating that a shortage of marine raw materials might restrain growth in fish farming’ (Cermaq 2004 p.21).
Safe food:
As mentioned in relation to question 1, one of the main objectives for the management of fish farms is safe food. FHL says that ‘[s]carcely any fish in the world is as strictly controlled as Norwegian farmed fish. Thousands of samples are taken of fish and feed every year, with a view to making sure [to] have a safe and tasty [fish]. […] Norwegian fish-farmers and feed producers are among the world leaders in traceability. […] [T]raceability along the entire value chain makes it possible to document the fish’s life-cycle from roe to table. [The consumer] can know where the fish […] has come from, where it grew up, what it has been eating and what its health certificate looks like’ (FHL 2005b p.12).

Healthy food:
‘Medical science the world over is unanimous in its recommendations: eat more salmon and other fatty fish. Fatty fish is good for the heart, the circulation and inflammatory conditions, and counters certain kinds of cancer. In addition, fatty fish is good for mental health; the fatty acids in fish oil are essential for the development of the brain and have a beneficial effect on depression, schizophrenia, Alzheimer’s and certain forms of hyperactivity’ (FHL 2005b p.10). It should further be mentioned that resent research has shown that the Omega-3 content in farmed salmon is more than double of what is found in wild salmon, with the positive effect this can have on people with coronary heart disease (Mozaffarian and Rimm 2006 p.1893-1895). ‘Eating fish is therefore a good investment in your own health. It tastes great into the bargain, and can be prepared in countless different ways’ (FHL 2005b p.10).

Animal welfare:
The salmon farming industry believes, as mentioned, that good fish health is good fish welfare. This has always been part of the industry’s agenda and part of its success. The industry participates actively in the development of rules and regulations, and in the work with a new animal welfare bill. The focus on fish health is also shown through a number of research projects and action plans that are initiated (FHL 2005d p.14). One of the core issues is the slaughtering process. The authorities are working on revised slaughtering regulations, which will prohibit the current use of CO2 as an anaesthetic in the slaughtering process (FHL 2006a p.26).
6.5.2 Results from the examination of the salmon farming group – values and threats

Since the farmed salmon is the ecological entity of primary interest for the salmon farming group, this is noted in the heading of the flourishing matrix. The answer to questions 1 and 2 about the values behind wild salmon, their habitats and commercial wild fish stocks are seen more as indirect values of interest for securing the long-term sustainability of the values behind farmed salmon. This is described in the first subsection. Further in the first section are the descriptions of the values behind farmed salmon, which are based on the answers to question 6.

The second subsection contains, as for the prosecutor groups, the result of the answers to questions 3, 4 and 5 about threats to values behind biodiversity.

The salmon farming group – flourishing matrix

As shown by the answers to questions 1 and 2, the salmon farming group has a primary interest in Norway’s long and fertile coastline, which is the foundation for sustaining active coastal communities that allow the fisheries and aquaculture industry to deliver seafood all over the world. On this basis they believe that the seafood industry is bound to have a tremendous impact on the future. In this connection they address two main topics, namely the sustainable management of the marine ecosystem and the production of safe food.

The following are, based on the answers to question 6, the descriptions of values behind farmed salmon seen from the perspective of the salmon farming group.

Life domain – life values

Again, as for most of the answers given by the other interest groups in the examination, it is the reference to animal welfare that most closely points towards the life value type within the life domain. The salmon farming group says they believe that good fish health is good fish welfare, and that this always has been part of the industry’s agenda and part of the industry’s success. I have therefore noted “animal welfare” in the flourishing matrix of the salmon farming group as well, as shown in mind photo 6.9.
Mind photo 6.9  Flourishing matrix – salmon farming group

Flourishing matrix
- values behind farmed salmon, which the salmon farming group is concerned about

<table>
<thead>
<tr>
<th>Values behind biodiversity</th>
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<tbody>
<tr>
<td><strong>Life domain</strong></td>
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<tr>
<td>Life values</td>
</tr>
<tr>
<td><strong>Biological domain</strong></td>
</tr>
<tr>
<td>Necessary life support Food sources</td>
</tr>
<tr>
<td><strong>Cultural domain</strong></td>
</tr>
<tr>
<td>Pure instrumental economic values</td>
</tr>
<tr>
<td>Recreational values</td>
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<tr>
<td>Aesthetic values</td>
</tr>
<tr>
<td>Scientific values</td>
</tr>
<tr>
<td>Evolutionary values</td>
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<tr>
<td>Symbolic values</td>
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<tr>
<td>Religious values</td>
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</tbody>
</table>

Biological domain – necessary life support food sources
Among the references in the examination of the salmon farming group pointing towards the necessary life support food sources within the biological domain is that fish, with regard to both protein and energy retention, is much more efficient than other domesticated animals. Another is that through salmon farming it is avoided that healthy fish oil, rich in Omega-3 fatty acids, is transformed into storable unhealthy edible fats. This, together with the general improvement in feed conversion efficiency in intensive fish farming, entails that the salmon farming group clearly advocates fish farming as the future way of upgrading feed grade marine protein and oil for human consumption.

It is further mentioned that by fishing down the food web, which means harvesting at lower trophic levels, the fish catches can be increased. An example is that 10 kg of raw capelin fish gives a potential catch of 0.7 kg cod filet, while catching 10 kg capelin for fish feed production will give 3.0 kg salmon filet. The conclusion, therefore, is that salmon culture is more efficient than wild cod production. This idea, i.e. that fishing down the food web to catch forage fish gives more protein yields than fishing consume fish stocks, is supported by Skagen.
Linked to this are calculations showing that catching and processing fish for human consumption at higher trophic levels is more energy-intensive in terms of fossil energy than catching fishes on lower trophic levels and using them for fishmeal and fish oil production. In addition, the salmon farming group contends, intensive fish farming has so far not led to greater pressure on wild fish stocks. On the basis of all this I have in the description of the life support values in mind photo 6.9 noted “efficient resource utilisation” as a value behind the farmed salmon.

Since the salmon farming group holds that Norwegian fish-farmers and feed producers are among the world leaders in traceability, and that the farmed salmon are equipped with a health certificate, I have also added “food safety” to the description of the life support values in mind photo 6.9. I have also added “healthy food”, on the basis that eating fish should be a good investment in people’s health. This is based on the findings that fatty fish is good for the heart, the circulation and inflammatory conditions, and counters certain kinds of cancer, and that it is good for mental health and the development of the brain.

Cultural domain – purely instrumental economic values and particular inner worth

Within the cultural value domain the values behind farmed salmon are especially related to the purely instrumental economic value type. As noted in mind photo 6.9 this concerns the creation of “employment, income and export revenue”. The group mentions that most of the farmed salmon are exported worldwide, which in 2005 generated an export revenue of about 13.5 billion NOK, and that the total of man-years, which directly and indirectly depend on fish farming, is estimated to be 19,500. The export revenue represents 5.2 % of Norway’s mainland export revenue when oil and gas are excluded.

With regard to the rest of the value types within the cultural domain, nothing is said about this by the salmon farming group.

The salmon farming group – threats to values behind biodiversity

As for the other interest groups, mind photo 6.10 shows the threats overview scheme with a summary of the main issues addressed in the answers of the salmon farming group to questions 3, 4 and 5. Since the threats from salmon farming activities and agendas to a great extent represent threats to the farming itself, more or less everything addressed by the salmon
farming group as a threat are also threats that should be handled by the salmon farming industry. This is also reflected by the mentioned intermingling of input to the questions 3 and 4, which I say is due to FHL’s consistently positive and proactive attitude aiming at solutions instead of focusing explicitly on addressing or disclosing threats.

**Mind photo 6.10  Overview of threats to values behind biodiversity – salmon farming group**

<table>
<thead>
<tr>
<th>Overview of threats to values behind biodiversity – salmon farming group</th>
<th>- threats for possible practical handling in relation to the ethical challenges of the salmon farming industry</th>
<th>- threats out of control of the salmon farming industry</th>
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<tbody>
<tr>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
<td>Threats caused by other activities and agendas (question 5)</td>
</tr>
<tr>
<td>Escapes incl. genetic and biological interactions</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon lice</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fish diseases</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pollution</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Area use</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Handling of farmed salmon</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon overfishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishmeal and fish oil production</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forage fisheries and overfishing</td>
<td>(X)</td>
<td>X</td>
</tr>
<tr>
<td>Alternative feed resources</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Climate change and fossil energy</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The salmon farming interests group – column for threats caused by salmon farming

The salmon farming group addresses, by the intermingling of input to questions 3 and 4, threats much like those addressed by the other interest groups. These are such as escapes, spread of diseases and salmon lice, use of medicines, copper and other toxic substances, use of coastal zone, increased demands for fishmeal and fish oil, reduced availability of traditional fish feed raw materials and emissions of CO2 to air.
In addition is animal welfare, where the salmon farming group says that it believes that good fish health is good fish welfare.

On this basis I have marked in mind photo 6.10 that the salmon farming group acknowledges that their own activities might represent a threat to values behind biodiversity, due to issues associated with the rows labelled “escapes”, “salmon lice”, “fish diseases”, “pollution”, “area use”, “handling of farmed salmon”, “fishmeal and fish oil production”, “alternative feed resources” and “climate change and fossil energy”. It should be mentioned specifically that “fishmeal and fish oil production” and “alternative feed resources” are marked because lack of these resources will have serious negative effects of the production of farmed salmon. Though the salmon farming group maintains that the demand for fishmeal and fish oil for fish feed production has so far not had any negative impacts on the forage fisheries, they support the need to develop and improve management models. This is why “forage fisheries and overfishing” is marked in brackets.

The salmon farming interests group – column for threats that should be handled by the salmon farming industry

The salmon farming group emphasises that it is important to handle issues related to escapes, salmon lice, diseases, medicine use, use of copper, nutrient loading, PCBs, dioxins, GMO, recirculation and negative impacts on ecosystems. These are all issues associated with the rows labelled “escapes”, “salmon lice”, “fish diseases” and “pollution” in mind photo 6.10. Associated with the row labelled “area use” are calls for coastal zone planning and effective coastal control and protection.

Issues associated with the row labelled “handling of farmed salmon” are addressed by the emphasis to care for animal welfare, including fish density in pens and slaughtering methods.

With regard to the rows labelled “forage fisheries and overfishing”, the salmon farming group calls, as mentioned, for the need to secure sustainable harvesting of fish by improved management models. This explicit call entails that the marking in mind photo 6.10 is not placed in brackets. Linked to the need for improved management is the increasing use of vegetable raw materials in fish feed production, utilisation of fish and bi-products, and optimal utilisation of raw materials, which is why the two rows labelled “fishmeal and fish oil” and “alternative feed resources” are also marked.
Lastly, the row labelled “climate change and fossil energy” is marked because of the addressed need to handle the challenges related to emissions to air, energy effective transportation and alternative energy sources.

The salmon farming interests group – column for threats currently caused by other activities and agendas
Threats from other kinds of activities and agendas mentioned by the salmon farming group are such as PCBs, dioxins, oil spill, radioactive pollution in the oceans, and GMO in feed raw materials. Theses are all issues associated with the row in mind photo 6.10 labelled “pollution”.

6.6 Brief summary – results of the examination
To ease the transition to the discussions and judgements in the next chapter, a brief summary of the results from the examination will be given. For this purpose, mind photo 6.11 shows a merge of the interest groups’ different flourishing matrixes. The summary also demonstrates, in more practical terms than was done in the previous chapter, the reasonableness and relevance of my suggested answers to the research questions of “Sustainability for whom?” and “Sustainability of what?”.

Flourishing matrix:
The most striking observation in relation to the research question “Sustainability for whom?” is that few of the values expressed in the examination say anything that can clearly be interpreted or understood to represent value-conferring properties for ascribing any degree of direct moral status value that would qualify wild salmon, their habitats, commercial wild fish stocks or farmed salmon for a moral stakeholder status. This is in line with my suggested answer where I say that I find it difficult to talk about the moral stakeholder status of ecological entities.
Flourishing matrix
- values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon, which the interests groups are concerned about

Values behind biodiversity

<table>
<thead>
<tr>
<th>Types</th>
<th>Descriptions</th>
<th>Ecological entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life values</td>
<td>Animal welfare, intrinsic value, life of their own, (respect)</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>(Intrinsic value)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal welfare, intrinsic value, life of their own</td>
<td>Farmed salmon</td>
</tr>
<tr>
<td>Biological domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Necessary life support food sources</td>
<td>Food source for Sami and Kven people</td>
<td>Wild salmon</td>
</tr>
<tr>
<td></td>
<td>Local and global food security, food safety and healthy food</td>
<td>Commercial wild fish stocks</td>
</tr>
<tr>
<td></td>
<td>Efficient resource utilisation, local and global food security, food safety and healthy food</td>
<td>Farmed salmon</td>
</tr>
<tr>
<td>Cultural domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purely instrumental economic values</td>
<td>Tourism, leasing out fishing rights, genetic source for salmon farming</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td></td>
<td>Wild fish catches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment, income and export revenue</td>
<td>Wild salmon and commercial wild fish stocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Farmed salmon</td>
</tr>
<tr>
<td>Recreational values</td>
<td>Salmon game fishing, catch and release, adventure, enjoyment of the outdoors, culinary delicacy, adventure and enjoyment</td>
<td>Wild salmon and their habitats</td>
</tr>
<tr>
<td>Aesthetic values</td>
<td>Fascination and inspiration, natural and cultural landscapes</td>
<td></td>
</tr>
<tr>
<td>Scientific values</td>
<td>Ecological awareness</td>
<td></td>
</tr>
<tr>
<td>Evolutionary values</td>
<td>Future generations</td>
<td></td>
</tr>
<tr>
<td>Symbolic values</td>
<td>Cultural identity</td>
<td></td>
</tr>
<tr>
<td>Religious values</td>
<td>Spiritual inspiration</td>
<td></td>
</tr>
</tbody>
</table>

Most explicit with regard to direct moral status value are the references of the animal welfare group to the capacity to suffer and the dispositions to avoid pain, added with the statement that animals are born to live their own lives. In the flourishing matrix I use this as the basis for the “animal welfare” and “life of their own” descriptions, indicating that wild and farmed salmon might have some kind of life value of the universal inner worth value category.

Further are the references from the environmental group stating that salmon is a highly revered species and that all living beings and the richness and diversity of life forms have intrinsic value. This is why I have noted “intrinsic value” as a possible life value both of wild salmon and their habitats and of farmed salmon. Vaguer is the reference to respect for all living organisms, which in the flourishing matrix is marked in brackets.
More extensive are the references in the examination to the purely instrumental and particular inner worth value categories within the biological and cultural domains. All these references demonstrate with practical examples what I indicate or hint at with my suggested answer to the research question of “Sustainability of what?”. I think here specifically of the notion that values behind biodiversity are firstly of the biological kind to secure survival, growth and reproduction, and secondly of the cultural kinds, involving such as adventure, recreation and aesthetics.

Together the above comments should justify my conclusion in Chapter 5 (Conceptual model – a primary goal) that judgements of ethical records in the case study should be done in the context of the traditional inter-human ethics. More questionable is my decision to judge ethical records also in the context of the nature-environmental ethical positions. A reason for judging ethical records in the context of the hedonistic nature-environmental ethics is that salmon, since they might be able to feel pain, should at least for precautionary reasons be treated as qualifying for a moral stakeholder status. With regard to judgements in the context of the proper nature-environmental ethics, this might be justified by the notion in the examination that the richness and diversity of life forms have intrinsic value. Independent of this, however, my ambitions are, as mentioned in Chapter 3 (Method – a post-normal science approach) to try to analyse the widest possible range of ethical issues related to the charge against the salmon farming industry. This ambition is among others triggered, I say in Chapter 1 (Introduction – research area), by the term “value of their own” used in the Norwegian Parliamentary Report (2005 p.3) regarding animal husbandry and animal welfare.

Threats to values behind biodiversity:
Mind photo 6.12 shows that among the interest groups it is believed that the salmon farming industry should be able to handle at least some parts of all the threats caused by their activities and agendas. The three threats related to escapes, salmon lice and handling of farmed salmon, and those alternative feed resource issues addressed, are uniquely caused by the salmon farming industry. This is quite logical because all the issues addressed here are rather farmed salmon specific. The other six kinds of threats mentioned are also caused by other activities and agendas. The only threat mentioned where salmon farming is not involved is salmon overfishing.
# Mind photo 6.12 Overview of threats to values behind biodiversity – all interest groups

<table>
<thead>
<tr>
<th>- threats to values behind biodiversity from the perspective of the interest groups</th>
<th>- threats for possible practical handling in relation to the ethical challenges of the salmon farming industry</th>
<th>- threats out of control of the salmon farming industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Threats caused by salmon farming (question 3)</td>
<td>Threats that should be handled by the salmon farming industry (question 4)</td>
</tr>
<tr>
<td>Escapes incl. genetic and biological interactions</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon lice</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fish diseases</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pollution</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Area use</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Handling of farmed salmon</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Salmon overfishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forage fisheries and overfishing</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fishmeal and fish oil production</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternative feed resources</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Climate change and fossil energy</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The recognition that the Norwegian salmon farming industry should to some extent be able to handle all the threats caused by their activities and agendas is important for the judgement process. Simultaneously I think it is just as important to recognise that threats to wild salmon, their habitats, commercial wild fish stocks and farmed salmon are also caused by other activities and agendas than those of the salmon farming industry. This is because I believe it is necessary when judging ethical records and trying to achieve ethical goals, just for the sake of fairness and balance, to be aware that salmon farming alone is not responsible for all threats to the values behind wild salmon, their habitats, commercial wild fish stocks and the farmed salmon itself.
7. Discussion and conclusions – *ethical records*

The semi-narrative case study continues in this chapter with the discussion and some concluding remarks, based on the examination and the examination results from the previous chapter. The discussion is, as mentioned in Chapter 3 (*Method – a post-normal science approach*), structured as a judgement process. This involves judgements of ethical records and verdicts related to the charge against the salmon farming industry. I will also suggest ethical goals and possible measures for keeping account of progress and achievements in relation to these goals. The judgements are about ethical records related to the strengths and weaknesses of the salmon farming industry’s activities and agendas. My ambition is, as also mentioned in Chapter 3 (*Method – a post-normal science approach*), to try to analyse the widest possible range of ethical issues related to threats to values behind biodiversity. The focus is as before on the values behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon. One exception is in relation to the use of fossil energy where I expand the focus to involve values behind biodiversity in general.

The judgements and verdicts build on the three ethical positions described in Chapter 5 (*Conceptual model – a primary goal*) and the ethical framework described in Chapter 4 (*Sustainability Context – contemporary perceptions*).

It should be recalled again that the main charge against the salmon farming industry is as follows:

The Norwegian salmon farming industry is charged with violating ethical values by threatening values behind wild salmon, their habitats, commercial wild fish stocks\(^{36}\) and farmed salmon of importance for the flourishing of moral stakeholders. These moral stakeholders are humans, and might also be ecological entities.

The main charge is, as mentioned in Chapter 3 (*Method – a post-normal science approach*), split into nine subcharges. The splitting into subcharges is done for the purpose of covering the widest possible range of ethical issues related to the charge. Each of the nine subcharges handles different kinds of threats to one or more of the values behind biodiversity referred to

\(^{36}\) It should be recalled that the term “commercial wild fish stocks” includes fish stocks for artisanal fisheries in developing countries.
in the charge. The seven first subcharges are made in the context of the traditional inter-human ethics. The eighth subcharge is made in the context of the hedonistic nature-environmental ethics, while the ninth subcharge is made in the context of the proper nature-environmental ethics. The reason why the charge is split into as many as seven subcharges in the context of the traditional inter-human ethics is that this involves the whole range of values behind biodiversity of the purely instrumental and the particular inner worth value categories. The subcharges in the context of the hedonistic and proper nature-environmental ethics involve on the other hand only judgements related to the universal inner worth behind biodiversity.

Judgements of ethical records are made for each of the subcharges, followed by a verdict. In connection with each subcharge, suggestions are also made for future ethical goals and possible measures for keeping account of progress and achievements in relation to the goals.

Structure – five subchapters
The judgement process is divided into three subchapters handling the subcharges in the context of the traditional inter-human ethics, the hedonistic nature-environmental ethics and the proper nature-environmental ethics, respectively. Judgments of ethical records of the activities and agendas of the prosecutor groups are also made within each of the subchapters. The reason for this is explained in the next subsection.

Following the first three subchapters containing the judgement process, the final conclusions will be presented in the fourth subchapter, where I will first comment on how the ethical records of the Norwegian salmon farming industry and the prosecutor groups relate to each other with regard to each of the three kinds of ethical positions. For each of the ethical positions, some comments will also be made as to how the case study contributes with input to the research questions. Then follows my main conclusion with regard to how the research questions are handled throughout the present investigation and to what extent my suggested answers to the research question should be regarded as reasonable and relevant. Added are also some concluding remarks about the role of science in relation to the issues handled in the present investigation.

Finally is the fifth subchapter with my practical recommendations regarding certain prioritised issues I believe are important for the Norwegian salmon farming industry to focus on when
developing systems for ethical environmental accounting. These are the practical
recommendations I believe represent the most interesting part in the conclusions of the present
investigation when viewed from the perspective and interests of the Norwegian salmon
farming industry.

It should be recalled, however, that the overall intention of the case study is to describe the
judgement process and possible outcomes from it. The final conclusions and the practical
recommendations should therefore be regarded as demonstrations of what might come out of a
real-life participatory process built on the methodological structure of the present case study.
They should more be seen as input for further debate and development, than firm and settled
conclusions from my side.

To make this input as comprehensive as possible I have decided to aim at making the
judgements of ethical records not only of the most obvious threats to values behind
biodiversity caused by salmon farming activities and agendas. I will also, in an effort to cover
a widest possible range of ethical issues, include some less obvious and uncertain threats as
well as some more hypothetical or marginal ones. In other words, this entails including worst
case scenarios of negative effects of salmon farming, and not only the most plausible ones.

Judgements of ethical records – six elements of the ethical framework
Before starting the judgement process, I will present six elements addressing different aspects
of the ethical framework for the judgements of ethical records, the verdicts and the
suggestions of ethical goals. These elements, partly recalled from Chapter 3 (Method – a post-
normal science approach), are about the three environmental ethical positions, how to
understand the term “good”, the Harm Principle and the Equity Principle, kinds of ethical
records, future generations and the ethical “landscape”.

Ethical framework I – environmental ethical position
The examination in the previous chapter reveals that values behind biodiversity, as perceived
by the different interest groups, to a great extent express values that are only relevant for the
traditional inter-human ethical position. Few point towards the hedonistic nature-
environmental ethical position or the proper nature-environmental ethical position. This
means that, as far as I can see, few of the stated values might be understood to represent or
involve value-conferring properties for ascribing any degree of direct moral status value that
would qualify for a moral stakeholder status to any of the four ecological entities handled in the case study. Most explicitly with regard to direct moral status value are the references of the animal welfare group to the capacity to suffer and the dispositions to avoid pain, added with the statement that animals are born to live their own lives. Of the same kind are the references from the environmental group stating that all living beings and the richness and diversity of life forms have intrinsic value.

Though the question remains unresolved of whether or to what extent salmon might be sentient and conscious, and thus have the ability to feel pain, it seems relevant, at least for precautionary reasons, to judge ethical records also in the context of the hedonistic nature-environmental ethics. The same applies to the proper nature-environmental ethics, though the basis for this is even weaker. Another reason for doing these judgements is the ambition to try to analyse the widest possible range of ethical issues related to environmental controversies.

In a real-life participatory process, however, when a verdict or final conclusion should be given or ethical environmental accounting should be done, I believe that a decision must be made with regard to what ethical position to build the judgements on. Such a conclusion might either be found through consensus among the moral stakeholders, by a majority or minority decision, by a third party with an authority accepted by all stakeholders or by the stakeholder alone who is working out ethical goals or developing an ethical environmental accounting system.

**Ethical framework II – good is good**

When judging ethical records there will, as explained in Chapter 3 (Method – *a post-normal science approach*), be some activities and agendas that are good, which results in a judgement of a strong ethical record, and some activities and agendas that are not so good or rather bad, which results in a weak ethical record. There will also be some activities and agendas that are neither specifically good nor bad, which will result in a neutral ethical record. The perceptions of what is “good” will, I explain with reference to Moore (1903 p.12-14), fully be left to the participants’ opinions or understanding, which for the case study is me. This is based on the trust that everyone knows what “good” is.
Ethical framework III – *the Harm Principle and the Equity Principle*

For the judgements of ethical records, it should be recalled that the Harm Principle and the Equity Principle are chosen as the ethical framework for the judgements of what is good and bad in relation to the environmental controversies. The Harm Principle is, as explained in Chapter 3 (*Method – a post-normal science approach*), about avoiding that moral stakeholders are harmed by ecosystem goods and services of bad quality. This is not about harm in the sense of an unfair distribution of and access to values behind biodiversity. It is rather about harm caused by the quality of the biodiversity. Two kinds of harm are handled. The first kind pertains to dangerous and unsafe conditions, for example if farmed salmon is unsafe to eat because it is contaminated by a toxin, or if climate change should increase the frequency of dangerous weather conditions. The second kind is not an issue of safety, but rather of quality. An example of this is if the health quality of farmed salmon, due to reduced Omega-3 content, is lower than expected.

The Equity Principle, however, is about the fair distribution of and access to needed and preferred values behind biodiversity. This is such as access to necessary life support food sources, including the use of acceptable substitutes, which might be different kinds of food.

Most of the judgements of ethical records in the context of the traditional inter-human ethics are done within the framework of the Equity Principle. The Harm Principle is applied in judgements related to food safety, food health and climate change, and in the context of the hedonistic nature-environmental ethics. Judgements in the context of the proper nature-environmental ethics are entirely done within the framework of the Equity Principle.

Ethical framework IV – *judgements of strong, weak and neutral ethical records*

The judgements of ethical records are, as described in Chapter 3 (*Method – a post-normal science approach*), limited to strong, neutral and weak records. For the safety part of the Harm Principle, where the focus is on avoiding serious and dangerous harm, it is decided that parties with activities and agendas causing no harm should be judged to have neutral ethical records. The records will then necessarily be weak if the activities and agendas are causing harm of some kind. Judgements of strong ethical records will, however, not be made in relation to safety harm, because it seems illogical to say that something is safer than safe. Food, as an example, is either safe or not safe. If some kind of food is safer than some other kind, this might rather be interpreted to touch upon issues of quality.
For the quality kind of harm, a quality lower than what would normally be expected will result in a weak ethical record. On the other hand, if the health quality exceeds what might be expected, the ethical record will be judged to be strong. This is such as if the contents of Omega-3 are higher than normally accepted or that the contents of contaminants are far below the accepted safety level. When the quality is as expected then the ethical record will be neutral.

For the Equity Principle, the ethical records will always be judged to be strong, neutral or weak. This is because impacts on the distribution of and access to values behind biodiversity are good, neutral or bad. Activities and agendas that help create a widest possible fulfilment of biological or cultural flourishing will give strong ethical records. This means improving the access to needed and preferred values behind biodiversity, either by improving the access to the ecological entities that traditionally create the specific values or by acceptable substitutes. Activities and agendas that limit or hamper the access to values behind biodiversity that contribute to flourishing will give weak ethical records, if acceptable substitutes are not offered. If there is no difference, then the records are neutral.

**Ethical framework V – future generations**

It should be recalled that I in the present investigation maintain that future generations will not be less diverse with regard to needs and preferences than the present one. It therefore seems reasonable to hold that long-term considerations of the needs and preferences of the present generation might be just as good an indicator as any other one in predicting future generations’ needs and preferences. It is therefore taken as a premise that if all judgements of ethical records have a long-term perspective, then this will in a satisfactory way, and probably as good as any alternative ways, take care of the needs and preferences of future generations.

**Ethical framework VI – practical ethical “landscape”**

The examination material reveals that there are diverging opinions on the seriousness of the negative impacts of the salmon farming industry’s activities and agendas. The prosecutor groups tend to believe that the impacts are seriously negative. The accused salmon farming industry, though realising that it faces challenges in this field, holds that the risk of seriously damaging the environment is low, compared to the benefits. Since there are diverging opinions to the seriousness of the negative effects of salmon farming, I have decided also to
add some judgements of the ethical records of the prosecutor groups’ activities and agendas. The ambition is to get a brief understanding of how the Norwegian salmon farming industry stand compared to the prosecutor groups with regard to ethical records. This is in an effort to get a widest possible picture of the practical ethical “landscape” within which the judgements of the salmon farming industry are done. By practical ethical “landscape” I think of the practical possibilities the salmon farming industry as well as the prosecutor groups have in the real world to achieving strong ethical records within the different fields addressed by the subcharges. This is important, I believe, when trying to set ambitious but still feasible ethical goals. Linked to this “landscape” is also the recognition mentioned in Chapter 6 (Examination and results – values behind biodiversity), that threats to wild salmon, their habitats, commercial wild fish stocks and farmed salmon are also caused by other activities and agendas than those of the salmon farming industry.

7.1 Traditional inter-human ethics – human stakeholders only

The discussion in the context of traditional inter-human ethics represents the situation where no ecological entities are ascribed a direct moral status value. They therefore do not qualify for moral stakeholder status and have no universal inner worth. This means that the values behind the four ecological entities handled in the case study are restricted to the purely instrumental and the particular inner worth value categories.

The judgements of ethical records are thus about human interests only. This means that the judgements within the Harm Principle and Equity Principle are in relation to values behind biodiversity that are of importance for humans’ biological and cultural flourishing.

Seven sections – life support food, economic values, particular inner worth, prosecutor groups

The seven subcharges handled in the context of traditional inter-human ethics are divided into five sections. These sections are sorted according to the value types described in the flourishing matrix. The first three sections handle life support food values behind farmed salmon, wild salmon and commercial wild fish stocks. It should be recalled that necessary life support food sources refer to types and amounts of food that are necessary for survival, growth and reproduction. In the flourishing matrix these are described as values behind
biodiversity within the biological domain, and in the inner worth table they are categorised as purely instrumental.

The fourth section is about the purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks, while the fifth is about the particular inner worth behind wild salmon, their habitats and biodiversity in general. These are all values behind biodiversity within the cultural domain. The economic values behind biodiversity are primarily about income, and as such work indirectly as a means to secure both biological and cultural flourishing. Also for the values behind biodiversity of the particular inner worth value category, which contribute to cultural flourishing, it often is necessary to take indirect contributions into consideration.

After this follows a sixth section with a short summery of the judgements of the salmon farming industry’s ethical records in the context of the traditional inter-human ethics. Finally, as a seventh section, are the judgements of ethical records of the prosecutor groups’ activities and agendas in the context of the traditional inter-human ethics.

7.1.1 Ethical records about necessary life support food I – values behind farmed salmon

This first of the three sections containing the judgements related to the access to necessary life support food deals with threats both to the food safety and to the health quality of farmed salmon. The judgements will, as already mentioned, be made within the framework of the Harm Principle. This means that the Norwegian salmon farming industry will be judged to have a neutral ethical record if the salmon they produce is safe and as healthy as expected. If not, the ethical records will be weak. A strong ethical record will, as mentioned, not be relevant for food safety, but will be used in judgements related to healthy quality.

It should be mentioned that the judgements in this section will influence the judgements in the two following sections. This is in the sense that the ethical records in relation to food safety and healthy food will be decisive for whether farmed salmon might be regarded as an acceptable substitute for wild salmon when thinking of their values as necessary life support food sources.
Subcharges about food safety and healthy food – unsafe food and reduced health quality

The first subcharge, related to values behind farmed salmon as a safe food source, is as follows:

The Norwegian salmon farming industry is charged with violating the Harm Principle by threatening the values behind farmed salmon as a safe life support food source. These are threats due to the risk that farmed salmon may be contaminated by PCBs, dioxins, radioactivity, oil spills or pharmaceuticals. The charge also concerns perceived threats due to the use of GMO in the production of farmed salmon.

The allegation mentioned in the examination is that the contaminations threaten human health.

The second subcharge, related to values behind farmed salmon as a healthy food source, is as follows:

The Norwegian salmon farming industry is charged with violating the Harm Principle by threatening the values behind farmed salmon as a healthy life support food source. These are threats due to the risk that farmed salmon can have reduced contents of Omega-3, since vegetable raw materials are used in salmon feed production.

The allegation mentioned in the examination is that the reduced contents of Omega-3, if not directly threatening to human health, at least reduces the expected health benefits of eating salmon.

Judgements of food safety and healthy food – the Harm Principle

The judgements of ethical records within the Harm Principle start with food safety. Then follow the judgements related to the health quality of farmed salmon.

Food safety – weak and neutral ethical records

The charge about food safety refers to three kinds of threats. The first one includes PCBs, dioxins, radioactivity and oil spills, which represent pollutions of the marine ecosystems caused by a great number of activities in the industrialised societies. The salmon farming industry might therefore hold that this is not their responsibility alone. Nonetheless, as long as
such pollutions involve the risk that farmed salmon might represent a threat to human health, the salmon farming industry is forced to handle this challenge. The second kind of threats are those related to GMO. They are referred to as perceived threats, because GMO in the examination are not described as toxic substances, but rather as representing challenges attached to possible threats and the general scepticism against GMO. For salmon farming this relates specifically to GMO in fish feed, but also to the use of GMO in vaccine production and the fear of genetically modified salmon. The third kind of threats to food safety are those caused directly by salmon farming activities, such as the use of pharmaceuticals to combat salmon lice and fish diseases.

Whatever the threats to food safety might be, whether they are caused by the industry or by others, the Norwegian salmon farming industry is in any case responsible for producing a salmon which the industry can by all means ensure is safe to eat. If not, the industry will be judged to have a weak ethical record. On the other hand, if the industry follows the rules and regulations set by the authorities and demands set by the consumers, and in general avoids anything they know might threaten the food safety of farmed salmon, my judgement is that they have a neutral ethical record.

But despite all the rules and regulations set by the authorities, and demands set by wholesale buyers and retailers, there are diverging perceptions in society and among consumers on what safe food is. This is especially so with regard to GMO, which tend more to be a market acceptance issue than a factual food safety issue. In such a situation, my opinion is that that the Norwegian salmon farming industry has a special responsibility for being transparent with regard to production processes. The consumers should have all information available that make them capable, on the basis of their own perceptions of food safety, to decide on whether they perceive farmed salmon to be safe to eat or not. If the salmon farming industry avoids declaring the use of specific ingredients, such as GMO, and levels of contaminants, just because the industry itself believes that the ingredients applied in fish feed and levels of contaminants in the farmed salmon are safe, my judgement is that this qualifies for a weak ethical record. It does not help, in my opinion, that the farmed salmon might be legal enough to sell on the markets just because it satisfies all the rules and regulations with regard to food safety. Even if the customers’ perceptions should build on such as feelings, scepticism or unfounded opinions, they should ultimately have the right to know exactly what they are offered and to choose on that basis. My opinion is therefore that the Norwegian salmon
farming industry should disclose all the information that is necessary for customers themselves to decide whether they regard the farmed salmon to be safe to eat or not.

On this basis my judgement is that the salmon farming industry, to be able to maintain a neutral ethical record, needs to be transparent with regard to production processes, and thereby allow the consumer to decide whether they regard the farmed salmon to be safe or not. Being transparent means here such as always declaring what raw materials are used and documenting the levels of possible contaminants in the farmed salmon. The industry needs to take both real and imagined threats to food safety into account. If not being transparent, my judgement is that the Norwegian salmon farming industry will have a weak ethical record, even though the industry might hold that the farmed salmon, according to the rules and regulations, is safe to eat.

In addition to being transparent, the salmon farming industry might choose to go a step ahead of all the rules and regulations, by more or less eliminating the PCB, dioxin and GMO problems, and to continue the positive achievements regarding the use of pharmaceuticals. This means in addition to good fish health control, selecting fish raw materials with low PCB and dioxin contents, and even cleaning out the contaminants. If the farmed salmon could thereby maintain a negligible use of pharmaceuticals, and have contents of PCBs and dioxins lower than what is found in wild fish, then the judgement might be that the salmon farming industry actually is safer than safe. A further step is to try to avoid GMO raw materials in fish feed. Together this might mean that the salmon farming industry, in addition to maintaining a neutral ethical record with regard to food safety, might be judged to have a strong ethical record. If so, this last judgement is probably more related to food health than food safety, and as such rather belongs to the following discussion of the values behind farmed salmon as a healthy food source.

Healthy food – weak and strong ethical records
The charge about healthy food refers specifically to the contents of Omega-3. If such as vegetable raw materials in fish feed should result in reduced contents of Omega-3, so that the health benefits of eating farmed salmon might be reduced, then the ethical record will be judged to be weak. This would especially be so if the consumers are not properly informed. If, however, the consumers are clearly informed about potentially reduced health benefits, then it might be considered to give the industry a neutral ethical record. However, I have doubts with
regard to such a judgement. This is because salmon might in general be imagined to be an especially healthy fish. The Norwegian salmon farming industry will therefore have a duty to deliver salmon that satisfy these expectations. The industry might not only be demanded to inform the customers about farmed salmon with a health quality lower than expected. I will suggest that if a neutral ethical record should be maintained, then such a salmon should be marketed with a distinctly different name or under a special brand to avoid any misunderstanding.

On the other hand, if the current situation is, as mentioned in the examination, that the Omega-3 content in farmed salmon is more than the double of what is found in wild salmon, then the judgement will be quite different. Considering the benefits that high contents of Omega-3 can have for people’s health in general and for people with coronary heart disease especially, my judgement is that the Norwegian salmon farming industry in this situation qualifies for a strong ethical record.

In addition, if the negligible use of pharmaceuticals is maintained, and the contents of PCBs, dioxins as well as GMO are kept lower in farmed salmon than in other food sources then this, as mentioned, will contribute to a strong ethical record in relation to healthy food.

Verdict about food safety and healthy food – not guilty, with a risk of being guilty
It is difficult, on the basis of the judgements above and the information available in the examination results, to decide on a verdict with regard to food safety. As long as the farmed salmon are exported worldwide and thus accepted in the different markets, this is at least an indication that the salmon are normally produced in accordance with rules and regulations set by the authorities. If such is the case, my verdict is that the Norwegian salmon farming industry is not guilty as charged in relation to food safety.

Simultaneously, however, I believe that the verdict would easily drop to guilty if the industry is unable to keep up with increased consumer demands to transparency. This means that the industry needs to be able and willing to declare and document anything about the production processes and the use of raw materials. Actually, to have a strong ethical record and keep the verdict of not guilty, the industry should do this before consumer demands might force them to do so.
The great discrepancy in the judgement of whether the Norwegian salmon farming industry has a weak or strong ethical record in relation to the health quality of farmed salmon, makes it difficult to render a verdict about this. As long as there are uncertainties with regard to this, however, and as long as farmed salmon is marketed as salmon without explicitly documenting that it has the health quality expected from a wild salmon, I will conclude that there is a risk that the salmon farming industry is guilty as charged.

**Ethical goals regarding food safety and healthy food – maintain neutral and achieve strong ethical record**

My suggestion for the Norwegian salmon farming industry is to try to maintain a neutral ethical record in relation to food safety. Transparency is, as mentioned, a key element of this. For the salmon farming industry to survive, I believe it is an absolute necessity that the consumers perceive farmed salmon as safe to eat.

On the basis of the possibility that farmed salmon might have higher Omega-3 content than wild salmon, and thus be especially healthy, my suggestion for the salmon farming industry is to strive always to produce salmon that for the sake of trust and confidence have a health quality that is never lower than expected and thus in average exceeds the expectations.

The same holds true also for the contents of PCBs, dioxins and GMO. If these contents are kept as low as possible, this also will contribute to a strong ethical record.

Another option is to produce a salmon with health qualities, or for that sake, qualities in general, that are different from wild salmon or from what is expected from a farmed salmon. If farmed salmon thereby actually appear as a different kind of fish, then the fish should be marketed under a different name in order to avoid a weak ethical record. This should then be a name that does not give associations and expectations related to wild salmon.

**Measures for keeping account of food safety and healthy food – safe and healthy farmed salmon**

On the basis of the examination I believe that the following measures might be useful for ethical environmental accounting. This means measures for reaching the ethical goals regarding food safety and healthy food, and for keeping account of achievements in relation to reaching these goals. All measures suggested relate to the importance of being transparent.
The suggested measures for keeping account of ethical records are as follows:

- Be updated on and work in accordance with the current rules and regulations and with the perceptions, demands and expectations of consumers
- Be updated on and take into account scientific knowledge available in relation to food safety and the health aspect of eating salmon, whether wild or farmed
- Document the use of pharmaceuticals
- Document levels of toxins such as PCBs, dioxins and residuals of pharmaceuticals in salmon delivered to the markets
- Document use of GMO and vegetable raw materials in the production of salmon
- Document use of GMO-free raw materials, use of raw materials with low PCB and dioxin contents, and cleaning of raw materials
- Document levels of Omega-3 in salmon delivered to the markets
- Be truthful as to whether the farmed salmon has the qualities expected of salmon, or whether it more is a food source of a different quality

7.1.2 Ethical records about necessary life support food II – values behind wild salmon

After the judgements of ethical records within the Harm Principle related to the life support values behind farmed salmon, this second section contains judgements related to impacts on the access to the values behind wild salmon as a necessary life support food source. These judgements are made within the framework of the Equity Principle. This means that the salmon farming industry will be judged to have a weak ethical record if it threatens the access to the life support food values behind wild salmon. If not, the record will be neutral. Should the Norwegian salmon farming industry in some way improve the access to the life support food values behind wild salmon, then the ethical record will be strong. It should be recalled that judgements of ethical records within the framework of the Equity Principle involves assessments about fair distribution and substitutability.

However, due to the relatively low annual yields in the harvest of wild salmon referred to in the examination results, it might be asked if wild salmon at all represents a necessary life support food source of any significance. The nearly 1,000 tonnes of wild salmon harvested
annually in Norway do not indicate so. For the 4.6 million inhabitants in Norway this represents an annual average of 220 grams of wild salmon, or one meal per year. Though wild salmon might represent an important supplement to the food supply locally, this probably applies to relatively few people. Even a potential increase in wild salmon catches to 2,000 tonnes annually would not make any big difference. An example of people that might claim to be dependent on wild salmon as a necessary life support food source is, as mentioned in the examination, the Sami and Kven people.

Despite these questioning of whether wild salmon might represent an important and necessary life support food source or not, I have decided to do judgements of ethical records in relation to this. One reason is that wild salmon after all is a key ecological entity in the present investigation. Another reason is that the case study, as mentioned, aims at doing the judgements of ethical records not only of the most obvious threats to values behind biodiversity caused by salmon farming activities and agendas, but also to include some less obvious or say more hypothetical or marginal threats.

**Subcharge about the life support food values behind wild salmon – reduced availability**

The subcharge related to values behind wild salmon as a life support food source is as follows:

The Norwegian salmon farming industry is charged with violating the Equity Principle by threatening the possible values behind wild salmon as a necessary life support food source. These are threats due to negative impacts from escapes, including genetically and biological interactions, salmon lice, fish diseases, pollution and area use.

The allegation mentioned in the examination is that the negative impacts threaten the viability of wild salmon stocks, in the sense that the stock sizes might be reduced.

**Judgements of the life support food values behind wild salmon – the Equity Principle**

For the judgements of ethical records in relation to the values behind wild salmon as a necessary life support food source, the focus will be on the following topics. The first is access to the life support food values behind wild salmon in general. The second is related to the livelihood of the Sami and Kven people. The third is about possible food shortage situations, if thinking of possible breakdowns in the normal trade systems for food supply.
General access to the life support food values behind wild salmon – neutral ethical record

Farmed salmon might, as mentioned in the previous section, be expected to have qualities similar to the life support values behind wild salmon. If farmed salmon by this represent a safe and healthy food source on a par with wild salmon, it is reasonable to believe that it should be accepted as a substitute, when speaking strictly about life support food. Therefore, with the annual production of 597,000 tonnes of farmed salmon referred to in the examination, it is reasonable to believe that a possible reduction in wild salmon catches caused by salmon farming might be compensated for. In that case my judgement is that the salmon farming industry has a neutral ethical record with regard to the life support values behind wild salmon.

The Norwegian salmon farming industry might even hold that they, with their annual production of 597,000 tonnes, actually increase the supply of the food values behind salmon in general, and that they therefore should be judged to have a strong ethical record. This might be right if the life support food values behind salmon, whether wild or farmed, should be so unique that it represents an absolutely necessary food source. This is probably not the case, though salmon, as mentioned, has special qualities as healthy food. As is discussed in the next subsection, it is questionable to what extent salmon farming actually increases the food supply in the total global picture. I will therefore maintain the judgement here that the Norwegian salmon farming industry has a neutral ethical record with regard to being a substitute for possible reductions in the wild salmon catches.

Some, however, may object to this judgement, because they cannot accept farmed salmon as a substitute to wild salmon. Reasons for this might be that the taste, texture and health qualities of farmed salmon are not accepted as being equal to those of wild salmon. If these taste, texture and health issues should be of a scale that makes farmed salmon useless as a food source, then the judgement above has to be revised. The Norwegian salmon farming industry would then be judged to have a weak ethical record since farmed salmon would not be accepted as a substitute. However, with all the Norwegian farmed salmon sold, and thus accepted worldwide on the different markets, as mentioned above, it sounds unlikely that farmed salmon should be useless as a food source for humans. The judgement will thereby, when still limiting it strictly to the access to life support food sources, remain with a neutral ethical record for the salmon farming industry. The taste, texture and health issues might then
rather be of the particular inner worth value category related to habits, traditions and culture, than of the purely instrumental life support food value discussed in this section. The questions of particular inner worth will be discussed in section 7.1.5 (Ethical record about particular inner worth – values behind wild salmon and their habitats, and biodiversity in general).

Livelihood of Sami and Kven people – neutral ethical record
The reference in the examination to the importance of salmon for the Sami and Kven settlements and culture in Norway points, as mentioned, towards wild salmon as a possible necessary life support food source for them. The same does the statement that loss of this resource and the possibilities for fishing salmon will seriously affect the Sami culture. The Sami and Kven people might claim that wild salmon is a necessary life support food source for them because of the long traditions in using wild salmon as an important food source. They might further claim that their livelihood standard will be reduced if their access to wild salmon should be restricted or totally eliminated. Nonetheless, even these groups of people may today have the option, I believe, to purchase farmed salmon as a safe and healthy life support food source. If such is the case, this entails that I judge the Norwegian salmon farming industry to have a neutral ethical record also in relation to Sami and Kven people. If on the other hand the farmed salmon is not perceived to be safe and healthy, then the salmon farming industry will have a weak ethical record. However, also here the reasons for why farmed salmon should not be accepted as a substitute is probably not a question of life support food, but is rather related to such as taste, texture, or other traditional and cultural issues of the particular inner worth value category.

Food shortage situations – strong ethical record
The underlying mechanism that makes it feasible to argue that farmed salmon might work as a substitute for wild salmon, as done in the situations above, is that most and perhaps all people living in Norway are more or less part of the national, regional European and global trade markets. This means that they will have a great variety of food alternatives available for purchase, including farmed salmon. However, should a situation appear where the trade systems break down due to such as trade restrictions, oil crises or war, and thus hamper transportation and the exchange of goods and money, then the situation would be different. People living in Norway might then depend more on local access to wild salmon or other kinds of local food sources to secure their life support needs, whether this is by their own harvest or by the local markets. In such a situation the salmon farming industry, if negatively
affecting local food sources such as wild salmon, will be judged to have a weak ethical record. If, however, this is seen as a force majeure situation, out of the control of the salmon farming industry, then it might be difficult to hold them ethically responsible for a food shortage situation. An exception is if salmon farming for food security reasons should explicitly by law be held responsible for not being a threat to the viability of wild salmon. In such a situation my judgement is that the salmon farming industry maintains a weak ethical record if they represent a threat to this ecological entity. If, however, farmed salmon on the contrary should be selected as a food source to rely on at the local and national level in a food security emergency situation, then my judgement is that the salmon farming industry has a neutral ethical record if the local supply of farmed salmon manages to balance the lost local harvest of wild salmon. Should farmed salmon in such a situation, due to the annual production volumes, appear as a substantial supplier of necessary life support food, then the ethical record will be judged to be strong. One argument in this connection, though most people would probably consider it to be rather cynical, is that escaped farmed salmon, which according to the examination exceeds the number of wild salmon, might work in a food supply emergency situation as a substitute for the possible lost harvest of wild salmon.

On the other hand, it might be considered to be double-edged, ironically enough, to argue for the use of farmed salmon as a substitute to solve the decimation of wild salmon. The reason is that if salmon farming activities seriously threaten wild salmon, due to escaped farmed salmon, salmon lice, fish diseases, pollution and area use, then this might just as well be a threat to salmon farming itself. If so, the farmed salmon would be of little help as a substitute, and my judgement would accordingly be that the salmon farming industry’s ethical record is weaker. Further, another disadvantage not supporting the possibility of relying on farmed salmon in food shortage situations caused by trade system breakdown is that the supply of raw materials for fish feed production might simultaneously be reduced considerably.

**Verdict about the life support food values behind wild salmon – not guilty**

My verdict, based on all the different judgements given above, is that the Norwegian salmon farming industry is on the whole not guilty as charged in relation to the values behind wild salmon as a necessary life support food. An important premise for this verdict is that farmed salmon is accepted as a substitute for the life support food values behind wild salmon. It is also important that the trade systems are functioning.
The verdict hinges on the food safety and healthy food issues. This means that to keep the verdict, the farmed salmon need at least to have a neutral ethical record in relation to food safety and healthy food.

**Ethical goals regarding access to the life support food values behind wild salmon – ethical record not of interest**

Due to the marginal importance of wild salmon in relation to Norwegians’ access to necessary life support food sources, it might, as mentioned, be asked whether this issue is at all interesting. Because of this and because the values behind wild salmon, as will be discussed later, appear more strongly within the particular inner worth value category, I do not find it worthwhile to think of ethical accounting in relation to the marginal importance of the values behind wild salmon as a necessary life support food source.

I will rather conclude that by focusing on keeping at least a neutral ethical record in relation to the food safety and healthy food issues, the Norwegian salmon farming industry will also cover possible ethical challenges related to the values behind wild salmon as a necessary life support food source.

**Measures for keeping account of the life support food values behind wild salmon – handle later**

Since I perceive the life support food values behind wild salmon to be marginal I will not present specific measures for ethical environmental accounting. I believe that possible measures for this are covered well by the other section, specifically in the discussion of values behind wild salmon of the particular inner worth value category.

**7.1.3 Ethical records about necessary life support food III – values behind commercial wild fish stocks**

Finally, within the biological domain are judgements related to impacts on the access to the values behind commercial wild fish stocks as necessary life support food. Like for the wild salmon, the judgements of ethical records in relation to commercial wild fish stocks will be made within the framework of the Equity Principle.
Subcharge about the life support food values behind commercial wild fish stocks – *reduced availability*

The subcharge related to values behind commercial wild fish stocks as life support food sources is as follows:

The Norwegian salmon farming industry is charged with violating the Equity Principle by threatening the values behind commercial wild fish stocks as a necessary life support food source. These are threats due to forage fisheries of raw materials for the production of fishmeal and fish oil to salmon feed production.

Three allegations about these threats are mentioned in the examination results. The first one is that the increased production of farmed salmon, and thus the increased demands for fishmeal and fish oil in fish feed production, puts pressure on the forage fisheries. This will ultimately result in overfishing. The second allegation is that forage fisheries, with their catches of lower trophic level fish species, take the food from the commercial wild fish stocks, and thus threaten these stocks. The third allegation is that salmon farming production volumes do not add to the world fish supplies.

**Judgements of the life support food values behind commercial wild fish stocks – the Equity Principle**

The judgements of ethical records within the Equity Principle in relation to the values behind commercial wild fish stocks are split into four subjects. The first subject is about world fish supplies. Then follow the judgements of threats to artisanal fisheries. These two first subjects represent a macro and a micro perspective of the question of fish supplies. The last two subjects cover judgements related to the production of luxury food, and judgements related to the utilisation of fishmeal and fish oil resources.

**World fish supplies – weak ethical record**

If the allegation is true that the demands for fishmeal and fish oil result in overfishing, my judgement is that the Norwegian salmon farming industry in this connection has a weak ethical record. If on the contrary the salmon farming industry is right in the statement that they so far have not put increased pressure on fishing, then they will get a neutral ethical record. But if the other allegation is true, that forage fisheries take the food from the
commercial wild fish stocks and thus threaten them, then my judgement of a weak ethical record will remain.

Should a reduction in the harvest of commercial wild fish stocks be substituted with farmed salmon, this will probably be possible and acceptable only to some degree. Seeing the around 2,500,000 tonnes annual Norwegian harvest of major commercial wild fish stocks (SSB 2007) against the 597,000 tonnes of farmed salmon harvested annually in Norway, there might be some potential for substitution. This must be seen, however, in relation to the allegation that production volumes of farmed salmon do not add to the world fish supplies since 4 kg of raw fish is needed to produce 1 kg of farmed salmon. It is therefore rather a risk that salmon farming activities will result in decreased global yields of fish. If this is right, my judgement is that the salmon farming industry has a weak ethical record in relation to the total supply of fish worldwide.

If, on the other hand, it is right, as referred to in the examination by the salmon farming industry and also by the scientific group, that salmon utilises forage fish better than commercial wild fish, this might on the macro level make more fish available for consumption. This refers to the calculations showing that 10 kg of raw capelin eaten by wild cod gives 0.7 kg edible filet, but if used for salmon feed would give a production of 3.0 kg edible salmon filet. The basic idea is, as the salmon farming group says with reference to Skagen, that the strategy of fishing down the food web to catch forage fish and even krill gives more protein yields than fishing commercial wild fish stocks. This is because the loss of nutrients from level to level in the food web is relatively high. Bellona supports the same idea when they say that possible alternatives for the future are proteins produced by marine resources harvested on lower trophic levels.

Therefore, if we imagine a scenario where the forage fisheries of lower trophic level fish are kept sustainable, and supposing that the calculations will work in practice, the result might be increased world fish supplies. My judgement would then be that the Norwegian salmon farming industry has a strong ethical record. But, as commented by the scientific group, these calculations are subject to debate, because energy flows between marine fish at different trophic levels are not well documented. Because of these uncertainties with regard to the practical application of utilising fish at lower trophic levels, any judgements of ethical record in relation to this seem difficult.
Due to the precautionary principle I altogether tend towards a weak ethical record for the salmon farming industry in relation to the world fish supplies.

**Artisanal fisheries – weak ethical record**

This subject is about the allegation that forage fisheries reduce the local fish stocks, which the local artisanal fisheries are dependent on, and by that threaten the local catches and local access to fish. Linked to this is the problem addressed by FAO that a consequence of the globalisation of the fish market, which includes fishmeal and fish oil, is that fish disappears from the local fish markets in countries where large groups of the population are poor. If these allegations are true and the result is reduced access to necessary life support food sources for poor people living in developing countries, such as in Chile, Peru and Brazil, then my judgement will be that the Norwegian salmon farming industry has a weak ethical record. Since there is no clear evidence in the examination material showing that there are clear and direct cause and effect relations between forage fisheries for raw materials to salmon feed production in Norway and reduced harvest in artisanal fisheries, it is difficult to make any judgement of ethical records in relation to this. However, due again to the precautionary principle, I will maintain my judgement of a weak ethical record until the salmon farming industry is able to present reliable scientific documentation showing that they do not cause reduced harvest in artisanal fisheries. Maintaining this judgement in the situation of uncertainty is also strengthened by the following discussion about luxury food, and the possibility that farmed salmon may help maintain or even increase the unfair global distribution of and access to basic life support food sources.

On the other hand, if looked at in the opposite way, it might be said, due to the seriousness and uncertainties of this matter, the salmon farming industry will be judged to have a stronger ethical record if it recognises this subject and attempts to sort it out. This means to use resources and investigate to what extent there might be a cause and effect relation between forage fisheries for fish feed raw materials and reduced harvest in artisanal fishing.

**Luxury food – weak ethical record**

It is mentioned in the examination that farmed salmon are largely consumed by the world’s most affluent people in Europe, USA, Japan, Southeast Asia and China, which already have ample access to necessary life support food. This together with the possible threat to fish
resources that poor people are dependent on as necessary life support food sources makes it difficult to see that the supply of farmed salmon helps much with regard to fair distribution of and access to necessary life support food. Adding that the salmon farming industry probably does not really add to the total world supply of fish worsen the picture. Farmed salmon might therefore not be regarded as a necessary, but rather as a luxury food product, which does not contribute to worldwide equity. This means if the ultimate consequence of salmon farming activities one way or another is that they help maintain or even increase the unfair global distribution of and access to necessary life support food sources, then my judgement is that the salmon farming industry has a weak ethical record.

Fishmeal and fish oil – *strong ethical record*
Since fishmeal and fish oil have been used as food and feed raw materials long before the Norwegian salmon farming industry was established, it seems relevant to look separately into the utilisation of these sources. The main result from the examination related to this is that the salmon farming industry utilises the marine raw materials better than most other usages. For the utilisation of fishmeal the calculations show that fish is much more efficient than other domesticated animals, with respect to both protein and energy retention. For fish oil the advantage of salmon farming is that the health value is sustained by avoiding transformation of healthy Omega-3 fatty acids into the storable unhealthy edible fats. Since salmon farming thereby provides better nutritional value than the traditional use of fishmeal and fish oil, this clearly advocates fish farming as a future way of upgrading feed grade marine protein and oil for human consumption. This alone is enough to judge the salmon farming industry to have a strong ethical record. If it in addition should be true, as the industry claims, that the forage fisheries have been stable during the growth of the salmon farming industry, and are thus not threatened by it, this will strengthen my judgement that the salmon farming industry has a strong ethical record in relation to the utilisation of fishmeal and fish oil.

Verdict about the life support food values behind commercial wild fish stocks – *guilty, but also not guilty*
It is difficult from the judgements to find that farmed salmon contribute to a fair distribution of necessary life support food worldwide. The tendency is that the Norwegian salmon farming industry reduces rather than increases the world fish supply, maintains an unfair distribution of food by supplying salmon to the world’s affluent people, and threatens local artisanal
fisheries through the forage fisheries. My general verdict in relation to the access to commercial wild fish stocks is therefore that the salmon farming industry is guilty as charged.

In this picture it should be added that if the utilisation of fishmeal and fish oil resources are viewed separately then my verdict is that the salmon farming industry is not guilty. This might also be the case if the calculations are correct about the efficiency of using fish or krill at the lower trophic levels as raw materials in fish farming. Nonetheless, despite any strong ethical record in relation to the utilisation of marine raw materials, the challenge that the salmon farming industry faces with regard to reduced supplies and unfair distribution of necessary life support food remains.

**Ethical goals regarding the life support food values behind commercial wild fish stocks – aim at strong ethical record**

The Norwegian salmon farming industry should seek to maintain the strong ethical record in relation to fishmeal and fish oil by keeping up and if possible improving the efficiency in the utilisation of these raw materials.

With regard to the other subjects, I suggest that the salmon farming industry first aims at a strong ethical record by providing reliable documentation, or at least initiating research, about the mentioned allegations. This is primarily in relation to overfishing in general and to the reduced artisanal fish catches in developing countries. That would itself, I believe, strengthen the industry’s ethical record.

Since the whole package of questions addressed here are more or less linked to modern industrialised production schemes and modern lifestyles, the salmon farming industry might hold that the challenges they are facing are common global challenges. On the other hand, this might be seen as a defensive attitude and a convenient way for the salmon farming industry to shirk its ethical challenges. However, the question of what individual companies and industries are really capable of doing and what their ethical responsibilities are within the societies and cultures where they operate, is pressing. This is because I believe that no realistic ethical environmental accounting system could be developed unless these challenges are at least addressed and the responsibilities are more adequately sorted out. One option in order to accomplish this is to encourage individual companies and industries, though it might be beyond their capacities to handle this properly, at least to address these challenges and
thereby increase the focus on such challenges. If taking such initiatives seriously by addressing the global challenges within the framework of salmon farming-related operations, the salmon farming industry should qualify, I think, for some degree of strong ethical record.

Measures for keeping account of the life support food values behind commercial wild fish stocks – improve equity

I believe that the following measures might be useful, at least to initiate a process towards improving ethical records in relation to an equitable access to the life support food values behind commercial wild fish stocks.

- Document and strive to improve the efficiency in the utilisation of fishmeal and fish oil
- Research the consequences of fishing down the food web for raw materials to salmon farming
- Research the effect of forage fisheries on commercial wild fish stocks, including artisanal fish stocks
- Research the impacts from salmon farming on people in developing countries
- Support initiatives that aim at reducing and eliminating the unfair global distribution of and access to necessary life support food sources.

7.1.4 Ethical records about purely instrumental economic values – values behind wild salmon, their habitats and commercial wild fish stocks

From the biological domain the discussion continues with judgements of the salmon farming industry’s ethical records within the cultural domain. This starts with the threats to the purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks, and continues in the next subsection with the particular inner worth.

As for the life support food values, the judgements of ethical records in relation to the purely instrumental economic value are made within the framework of the Equity Principle. This means that the Norwegian salmon farming industry will be judged to have a weak ethical record if it threatens purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks. If not, the record will be neutral. Further, to the extent the
The Norwegian salmon farming industry is charged with violating the Equity Principle by threatening the purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks. These are threats due to impacts from escapes, salmon lice, fish diseases, pollution and area use, in addition to the forage fisheries for the production of fishmeal and fish oil. The threats are similar to those mentioned in the charges related to the access to the life support food values behind wild salmon and commercial wild fish stocks.

The allegations in this connection is that negative impacts threaten local income possibilities related to salmon game fishing, local and global income and employment related to fishing on commercial wild fish stocks, and the importance of wild salmon as a gene source to secure the future economic values behind farmed salmon.

Judgements of purely instrumental economic values – the Equity Principle

For the judgement of ethical records within the Equity Principle in relation to the purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks, the focus will be on four topics. The first is the local income and employment from wild salmon activities in Norway, such as tourism and leasing out fishing rights. The second topic is the income and employment from fisheries on commercial wild fish stocks in Norway, followed by the income and employment from artisanal fisheries in developing countries. The final topic is a judgement related to wild salmon as a genetic source for salmon farming.

Local income from wild salmon activities in Norway – weak and strong ethical record

The purely instrumental economic values behind wild salmon refer, as mentioned in the examination, to spin-off effects such as jobs and revenue garnered from tourism and the
leasing out of fishing rights. The revenue from the sales of harvested wild salmon, both current and potential, is low compared with the spin-off effects.

If negative impacts from the Norwegian salmon farming industry on wild salmon and their habitats reduce the income bases of people affected by this, then this alone would entail that the salmon farming industry will be judged to have a weak ethical record. However, if the revenues from exports of farmed salmon represent employment and income opportunities that are accepted as substitutes for lost income from the economic values behind wild salmon and their habitats, then my judgement is that the salmon farming industry has a neutral ethical record. Further, if the salmon farming industry could demonstrate that their activities compensate for more than possible reductions in the economic values behind wild salmon and their habitats, and also that their activities stimulate the local economy of coastal communities and strengthen employment and income opportunities, then the salmon farming industry might be judged to have a strong ethical record. At least at the national level, the farmed salmon export value of 13.5 billion NOK in 2005, compared with the estimated 2-4 billion NOK from wild salmon-related activities, should point towards a strong ethical record for the salmon farming industry in relation to purely instrumental economic values.

There might, however, be some localisation conflicts linked to the judgement above, since people engaged in wild salmon-related activities are not necessarily located in the same places as salmon farming activities. This might entail ethical distribution or fairness questions in the sense that salmon farming activities, though enhancing local economies in general, might reduce some people’s income while creating increased income opportunities for others. In response to this, the Norwegian salmon farming industry might hold that this is actually not a problem specifically related to salmon farming, but should more be regarded as a general development challenge, which rural as well as urban areas are facing under shifting economic cycles. Depending on the extent to which the local distribution conflicts might appear, my judgement of the ethical record of the salmon farming industry will shift between being weak and strong.

Income from commercial wild fish stocks in Norway – weak and strong ethical record

As for the judgement in relation to the life support values behind commercial wild fish stock, the Norwegian salmon farming industry will have a weak ethical record if the demands for fishmeal and fish oil and thus the forage fisheries should take the food from the commercial
wild fish stock in Norway. This is because the effects will be reduced fisheries and thus reduce the income and employment possibilities. But again, just as for the purely instrumental economic values behind wild salmon, the salmon farming industry might be judged to have a strong ethical record if it compensates for possible losses by substitute income and employment. Support to this last judgement is that the salmon farming industry on the national level represents a substantial economic value. This is demonstrated in the examination by the farmed salmon export value of 13.5 billion NOK in 2005, which represents more than 40 % of the total export value of Norwegian seafood. When most of the salmon farming related activities are located in coastal areas, and thus stimulates the local economy of coastal communities and strengthens employment and income opportunities, this should support the judgement of a strong ethical record. The problem or uncertainty with this judgement is that there, as far as the examination reveals, are no clear cause and effect relation documenting whether and in case to what extent forage fisheries might cause reduction in commercial wild fish stocks in Norway. But again, there might also here be some localisation conflicts entailing ethical distribution or fairness questions and thus a weaker ethical record. This means that the better the positive economic effects of salmon farming are spread to people living in the coastal areas of Norway and the better the equity element is taken care of, the stronger the ethical record of the salmon farming industry might be.

With regard to an isolated assessment of the economic valuation of the forage fisheries, the salmon farming industry might be judged to have a strong ethical record in the sense that it maintains the demands for fishmeal and fish oil. This will especially be the case if it is right that the salmon farming industry has not put pressure on forage fisheries that will result in overfishing. On the other hand, if the demand for fishmeal and fish oil ultimately should result in overfishing, my judgement is that the salmon farming industry has a weak ethical record. This judgement is similar to the judgement made in relation to the necessary life support value of the commercial wild fish stocks.

**Income from artisanal fisheries – weak ethical record**

If forage fisheries for fish feed raw materials should reduce the harvest in artisanal fisheries in developing countries, this would not only affect the already discussed supply of necessary life support food. It would also affect the economic income base in societies dependent on artisanal fisheries. My judgement in such a situation would be that the Norwegian salmon farming industry has a weak ethical record. One difference with regard to the economic values
behind the artisanal fish stocks compared to the life support food value is that forage fisheries might result in substitutes by local fishmeal and fish oil production, fish feed production, fish farming or other aquaculture activities. This will increase the local employment and income. If this should happen, the judgement would be that the salmon farming industry at least has a neutral ethical record, and maybe also a strong record if the substituted local employment and income should be better than those from the traditional artisanal fisheries. But again, there will probably be some localisation conflicts entailing ethical distribution or fairness questions.

**Genetic source for salmon farming – weak ethical record**

If the situation should arise that wild salmon, due to the negative impacts of the salmon farming industry, are seriously decimated or go extinct, then there would be little or no genetic resources left to secure the genetic future of the farmed salmon and thus the future economic values behind the farmed salmon. Should this occur, my judgement is that the salmon farming industry will have a weak ethical record, since it will negatively impact the income base and flourishing of its employees and owners.

**Verdict about purely instrumental economic values behind biodiversity – not guilty and guilty**

If affecting wild salmon or commercial wild fish stocks in Norway my verdict is that the Norwegian salmon farming industry is not guilty as charged in relation to the purely instrumental economic value. This is because I in general perceive the salmon farming industry to represent an acceptable substitute by creating income and employment, especially in coastal areas. This is despite the inequity that might arise due to the localisation problems, and despite the uncertainty with regard to the effect of forage fisheries on commercial wild fish stock.

In the global context, the challenges are more or less equal with those discussed in relation to the life support food value of the artisanal fisheries. This means a verdict saying that the salmon farming industry is guilty, unless the challenges are addressed and efforts are made to have them solved.

For the values behind wild salmon as a genetic resource for the salmon farming industry, the situation is unclear. Due to the precautionary principle I tend towards the judgement that the salmon farming industry has a weak ethical record. My verdict is therefore that the Norwegian
salmon farming industry is guilty unless the challenges are addressed stronger and efforts are made to sort them out.

**Ethical goals regarding purely instrumental economic values behind biodiversity – aim at strong ethical record**

The salmon faring industry should maintain the strong ethical record in relation to creating income and employment, especially in coastal areas, and seek to spread positive economic effects of salmon farming as much as possible among people living in the coastal areas of Norway.

With regard to the challenges related to the artisanal fisheries and the values behind wild salmon as a genetic resource, my suggestion is, as indicated already, that the salmon farming industry should aim at a strong ethical record by providing reliable documentation, or at least initiating research, related to these challenges.

**Measures for keeping account of purely instrumental economic values behind biodiversity – income distribution**

I believe that the following measures, which have some similarities with those recommended in connection with the life support food values behind commercial wild fish stocks, might be useful both to maintain a strong ethical record in relation to the activities in Norway, but even more importantly to strengthen the ethical record in the global context, and especially in relation to artisanal fisheries.

- Document the creation of income and employment, especially in coastal areas
- Research the consequences of fishing down the food web for raw materials to salmon farming
- Research the effect of forage fisheries on commercial wild fish stocks, including artisanal fish stocks
- Research the impacts from salmon farming on people in developing countries
7.1.5 Ethical records about particular inner worth – values behind wild salmon and their habitats, and biodiversity in general

The judgements of the salmon farming industry’s ethical records within the cultural domain continue with the threats to the particular inner worth behind wild salmon and their habitats. It should be recalled that the particular inner worth value category in the flourishing matrix is described by the recreational, aesthetic, scientific, evolutionary, symbolic and religious value types.

The judgements of ethical records about particular inner worth are made within the framework of the Equity Principle. This means that the Norwegian salmon farming industry will be judged to have a weak ethical record if it threatens the particular inner worth behind wild salmon and their habitats. If not, the record will be neutral. The ethical record will also be neutral if their activities or agendas, in the sense of creating acceptable substitutes, contribute to a cultural flourishing that is perceived to be just as valuable as the flourishing created by the values behind wild salmon and their habitats. This means that such substitutes, if they additionally contribute to increase the potentials of cultural flourishing, might result in a judgement of a strong ethical record of the salmon farming industry.

Included in the judgements of ethical records within the cultural domain are threats due to the use of fossil energy. The reason why this is handled here is that the consequences of climate change for many people in Norway pertain as yet to cultural values behind biodiversity. These are such as reduced comfort, due to more wind and rain, reduced skiing abilities, due to less snow, or reduced salmon game fishing, due to changes in salmon habitats. However, since climate change might at the utmost have serious impacts, such as damaging winds, floods, drought and seawater elevation, which some people have already experienced, the judgements are also seen from that perspective. In principle, this goes beyond particular inner worth and covers actually the whole range of biological and cultural values behind biodiversity. These judgements are therefore made within the framework of the Harm Principle.

Subcharge about particular inner worth – threat to wild salmon-related activities and values behind biodiversity in general

The subcharge related to values behind wild salmon of the particular inner worth value category is as follows:
The Norwegian salmon farming industry is charged with violating the Equity Principle by threatening the particular inner worth behind wild salmon and their habitats. These are threats due to impacts from escapes, salmon lice, fish diseases, pollution, area use and also use of fossil energy.

The allegations related to the particular inner worth behind wild salmon and their habitats are primarily about threats to recreational values, such as the enjoyment and adventure of salmon game fishing, and aesthetic values, such as nature’s beauty, power and purity. Partly linked to this, but more related to the scientific value types, are threats to the human fascination for the wild salmon’s biological life cycle, and the general values behind biodiversity and awareness following from this. Linked to this are also threats to the evolutionary value type, including issues related to the Convention on Biological Diversity, the flourishing of future generations and ecological awareness in general. Other values mentioned that might also be threatened are linked to the symbolic and religious values behind wild salmon and their habitats. These are such as the spiritual and religious customs of the Sami and Kven culture, and the symbolic values of wild salmon and wilderness both as part of regional and national identities in Norway.

The additional fossil energy-related subcharge about values behind biodiversity in general is as follows:

The Norwegian salmon farming industry is charged with violating the Harm Principle by using fossil energy. These are, as part of the global challenge of climate change, a threat to all kinds of values behind biodiversity.

The allegation is simply that the production of and transportation to the markets of farmed salmon contribute to the global climate change.

Judgements of particular inner worth – the Equity Principle and the Harm Principle

The judgements of ethical records within the Equity Principle starts with the particular inner worth behind wild salmon and their habitats, and ends with the judgements within the Harm Principle about the effect of climate change on values behind biodiversity in general.
Particular inner worth – weak and strong ethical record

One important recognition regarding judgements of ethical records in relation to particular inner worth is that the values of this category cannot be substituted by purchasing alternatives as easily as for the purely instrumental life support values. An example is if the salmon stock in one river is degraded or extinct, then moving to another river does not necessarily give the same recreational and aesthetic experiences, or make it possible to bring forth the same good feelings or memories. This more specific or particular character of the particular inner worth behind biodiversity entails that the Norwegian salmon farming industry will be judged to have a weak ethical record if they destroy or threaten some of these values within the cultural domain without being able to replace them with acceptable substitutes. Taking into consideration that many of the needs and preferences related to particular inner worth are rooted in long-term traditions and cultures, this probably will make it even more difficult for the salmon farming industry to be accepted to have a strong ethical record. The wild salmon group argues for the importance and ethical duty of taking care of the traditional values that many people appreciate and enjoy in relation to the wild salmon. If they gain support for their argumentation, then the salmon farming industry will easily be judged to have a weak ethical record.

On the other hand, because of the great variety of interests and value perceptions when it comes to the values behind biodiversity of the particular inner worth value category, the salmon farming industry might be perceived to offer an indirect substitute by enhancing the economy of local coastal communities. What I think of here is the increased opportunity this will create for people to live in the coastal communities and to enjoy the varieties of particular inner worth behind the biodiversity available there. These are the whole range of recreational, aesthetic and others of those value types mentioned in the flourishing matrix.

My judgement is that this indirect way of contributing with access to substitutes will strengthen the ethical record of the salmon farming industry. The validity or viability of such an argument is linked, as I see it, with the general processes of change in the modern industrialised world, where rural areas in general are struggling to keep their communities alive. This means that though the extent of particular inner worth linked to wild salmon-related activities might be reduced or even lost due to salmon farming, the overall possibilities of flourishing within the cultural domain will increase since more people, due to salmon farming activities, will be able to live in coastal communities. Also those already living there
will be able to enhance their opportunities to fulfil their flourishing potentials within the cultural domain by enjoying all other available kinds of values behind biodiversity. These could both be values of the particular inner worth value category in the local coastal areas and values in other places which due to the income possibilities can be reached by travelling. The alternative, the Norwegian salmon farming industry might hold, is that less people in the coastal areas will be able to fulfil their flourishing potential linked to particular inner worth if traditional wild salmon interests should be preferred and salmon farming should be banned. The question is if the reduction in flourishing possibilities due to reduced or terminated values behind wild salmon can be ethically traded against the flourishing possibilities created by the salmon farming industry’s activities and agendas. If so can be done, then the salmon farming industry will be judged to have a strong ethical record if they contribute to the flourishing of the many instead of the few. This is more generally, as I see it, about trade-offs between sacrificing some people’s preferred particular inner worth behind biodiversity on the one hand, in order to create alternative value opportunities for others, and perhaps even more people, on the other hand. Though it is defined beyond the limits of the present investigation, it should be mentioned here that also the great variety of values behind cultural entities that modern people value should be taken into account in such trade-offs. These are values behind such as cars, roads, theatres, sports arenas, shopping centres and coffee bars, which also contribute to people’s cultural flourishing.

If, however, most people in the coastal areas and elsewhere consider that the particular inner worth of wild salmon and their habitats are irreplaceable and should by all means be protected, then the salmon farming industry has a serious challenge. Any negative impacts on these values by the salmon farming industry will entail that the industry, according to my judgements, has a weak ethical record.

Since some might hold that religious and symbolic values should be considered as basic for the fulfilment of humans’ flourishing potential, it might be argued that these values in any case should be secured. Such religious and symbolic values behind wild salmon and their habitats are probably not a big issue for most people living in Norway, but they might be so for members of the Sami and Kven people. To the extent that this should be considered, the salmon farming industry’s ethical record will be weak in relation to how it might disturb or disrupt the particular inner worth behind the wild salmon and their habitats of importance for the Sami and Kven people’s religious and symbolic traditions and culture.
Fossil energy – weak ethical record

With regard to the global threats of climate change, my judgement is that the Norwegian salmon farming industry due to the use of fossil energy both in the production of farmed salmon and in distributing farmed salmon all over the world, has a weak ethical record. This is because it increases the threats to the particular inner worth behind wild salmon and their habitats discussed above, but just as much because it also threatens values behind biodiversity in general both locally and globally. On the other hand, the industry might defend itself by saying that they are here just one single part of a world society that is entirely based on and dependent on fossil energy and extensive global transportation, and that they therefore cannot be responsible for this.

Verdict about particular inner worth – guilty or not guilty

My verdict related to the particular inner worth behind wild salmon and their habitats is split in two. First, if restricting the judgements to the particular inner worth behind wild salmon and their habitats specifically, my judgement is that the Norwegian salmon farming industry is guilty as charged. This is because there is a risk the salmon farming industry’s activities and agendas may threaten values behind wild salmon and their habitats of the particular inner worth value category. Added to this is that the salmon farming industry is unable to deliver any substitutes that directly can compensate for lost values. Since there are diverging opinions to the seriousness of the negative impacts form salmon farming, I have taken the precautionary principle into account when giving the verdict of guilty. If adding the use of fossil energy and the climate change threats, this strengthens the verdict of guilt.

On the other hand, due to the income and employment possibilities in coastal areas created by the salmon farming activities, as well as the overall prospects for cultural flourishing in general that this opens for, my second verdict is that the salmon farming industry is not guilty as charged. This verdict takes into account the overall perspective on values behind biodiversity and also values behind cultural entities, which means that some people like the outdoors, while others like coffee bars, and some prefer parks or cultural landscapes before wilderness and pristine nature.

It should also be added that this verdict of not guilty depends on an acceptance of the perception that the salmon farming industry is kind of trapped within the fossil energy use
habits of our modern industrialised and global trade based civilisation. This means that the industry in practice has few other options if striving to survive under such market conditions. On the other hand, just by being a part of this modern lifestyle, the salmon farming industry is guilty as charged due to its contribution to climate change.

**Ethical goals regarding particular inner worth – aim at strong ethical record**

My suggestion is that the Norwegian salmon farming industry increases the efforts in reducing negative impacts both on wild salmon, their habitats and biodiversity in general. At the same time the industry should address the question of how equity can best be achieved in relation to needed and preferred particular inner worth behind biodiversity and humans’ cultural flourishing in general.

**Measures for keeping account of particular inner worth – reduce impacts and secure income**

The following measures might help to improve the acceptance of the salmon farming industry’s activities and agendas and by that strengthen its ethical record.

- Implement measures that reduce negative impacts from escapes, salmon lice, fish diseases, pollution and area use
- Continuously strive to reduce the use of fossil energy and the emissions of greenhouse gases
- Help maintain and improve the income base and employment opportunities in rural areas

**7.1.6 Summary of salmon farming industry’s verdicts – wild salmon, their habitats, commercial wild fish stocks and farmed salmon**

As long as farmed salmon are produced in accordance with rules and regulations set by the authorities, my verdict is that the Norwegian salmon farming industry is not guilty as charged in relation to food safety. I see the acceptance of farmed salmon in the markets worldwide as an indication of this. The verdict, however, is dependent on the industry’s ability to keep up with increased consumer demands to transparency. This links with the health quality of farmed salmon where the variety of customer perceptions of what is good, requires a high
degree of transparency. Here I tend towards a verdict of guilty on the basis of what I perceive is the current transparency status of the salmon farming industry.

Further, when moving to the life support food values behind wild salmon, my verdict is that the salmon farming industry on the whole is not guilty. The premise for this verdict is that farmed salmon is accepted as a substitute life support food source. With regard to the life support food values behind commercial wild fish stocks the situation is different. Here my verdict is that the salmon farming industry is guilty as charged. This is because the tendency is that the industry reduces rather than increases the world fish supply, maintains an unfair distribution of food and represents a possible threat to local artisanal fisheries through the forage fisheries. I advice in connection with this the industry to address these issues and make efforts to have them solved.

When focussing specifically on the utilisation of fishmeal and fish oil resources, my verdict is that the salmon farming industry is not guilty. This verdict might also hold for use of lower trophic levels in general as raw materials in fish farming, if the calculations about the efficiency in this should turn out to be correct.

For the purely instrumental economic values behind wild salmon, their habitats and commercial wild fish stocks in Norway my verdict is that the Norwegian salmon farming industry is not guilty, since I perceive the salmon farming industry to represent an acceptable substitute by creating income and employment in coastal areas. In the global context, however, especially in relation to the purely instrumental economic values of the artisanal fisheries, my verdict is that the salmon farming industry is guilty. This verdict might be changed if the salmon farming industry addresses these challenges and make efforts to have them solved.

Related to the threats to the values behind wild salmon as a genetic resource my verdict, due to the precautionary principle, is that the salmon farming industry is guilty. Dependent on the strength by which the industry addresses the challenges and makes efforts to eliminate these threats, the verdict will move towards not guilty.

Lastly, with regard to the particular inner worth behind wild salmon and their habitats, my verdict is that the Norwegian salmon farming industry is guilty, if limiting the verdict to the
specific interests of the wild salmon group. The use of fossil energy and the climate change threats caused by the salmon farming industry strengthens this verdict of guilt. On the other hand, if widening the scope to access to the particular inner worth behind biodiversity in general and the prospects for cultural flourishing of people living in coastal areas, my verdict is that the salmon farming industry is not guilty. I add that this verdict depends on an acceptance that the salmon farming industry is kind of trapped within the fossil energy use habits of our modern industrialised and global trade based civilisation.

7.1.7 Prosecutor groups’ ethical records – wild salmon, their habitats, commercial wild fish stocks and farmed salmon

Lastly in the context of the traditional inter-human ethics are the judgements of the prosecutor groups’ ethical records.

Life support food values – prosecutor groups
Starting with the life support food values behind biodiversity, my judgement of the wild salmon group is that they have a strong ethical record in relation to wild salmon as a food source. But since the importance of wild salmon with regard to secure necessary life support food is rather limited the wild salmon group’s ethical record has little practical significance. One exception is in relation to the Sami and Kven people’s needs and preferences, where the wild salmon might be said to be an important food source. With regard to the life support food values behind the commercial wild fish stocks, the activities and agendas of the wild salmon group have little relevance.

My judgement of the environmental and scientific groups is that they have a strong ethical record in relation to life support food. This is because they are concerned about long-term conservation and ecological stability of species and ecosystems, and thus that their activities and agendas in general contribute to concern for, protection of and conservation of food producing systems and food sources. The ethical strength of the environmental group is however dependent on protection and conservation schemes allowing harvest of seafood resources necessary for human survival, growth and reproduction. The scientific group qualifies specifically, I think, for a strong ethical record because it addresses and brings awareness to the question of local fish supplies in development countries and also generally
asks if fish farming by the use of forage fisheries resources adds to the global fish sources available for human consumption or not. When it comes to the animal welfare group it might be said that they in this situation have a weak ethical record if the consequences of their positions regarding handling of animals should result in lack of necessary life support food sources available. This is especially so if fishing on commercial wild fish stocks should be strongly restricted or banned.

The vegetarian argument, however, expressed both by of the animal welfare and environmental groups, is ethically strong in the sense of food security, since more people can be fed per area unit of land if used entirely for production of human vegetable food sources. In general this is about the efficiency of moving down the food web to harvest food sources at the lower trophical levels. This is currently of greatest relevance in relation to agriculture, but will be of increased importance also for salmon farming since more and more vegetable raw materials are used in fish feed production, and since trials are ongoing for fishing down the food web for raw materials to fish feed production. This should imply, just like in agriculture, the question of using lower trophic levels of aquatic organisms directly for human consumption.

Ranking the different prosecutor groups with regard to ethical records in relation to life support food, my judgement is that the scientific group has the strongest ethical record because of the concern for the supplies of fish resources and fairness in the access to them. This is followed by the environmental group, and also the animal welfare group when focussing on the vegetarian argument. The wild salmon group has the weakest ethical records among the prosecutor groups.

The salmon farming industry ends with a weak ethical record compared with the scientific and environmental groups, and also in relation to the vegetarian argument. This is primarily, I think, because the addressed tendency that the salmon farming industry reduces rather than increases the world fish supply, maintains an unfair distribution of food and represents a possible threat to local artisanal fisheries through the forage fisheries. The salmon farming industry might however locally in Norway be ranked higher than the wild salmon group because farmed salmon represents a better potential as a life support food source than wild salmon.
**Purely economic values – prosecutor groups**

Much of the same judgements as those given in relation to the life support food values apply for the judgements of the prosecutor groups’ activities and agendas in relation to the purely economic values. This is such as when my judgement is that the scientific group has a strong ethical record in relation to the purely economic values behind the commercial wild fish stocks because of its focus on the total world fish supply and the global fairness in the access to these resources. Similarly also is it that both the environmental group and the scientific group have a strong ethical record due to their concern about long-term conservation and ecological stability of species and ecosystems, and thus the protection of and conservation of food producing systems and food sources. For the wild salmon group my judgement is that they have a strong ethical record in relation to the purely economic values behind wild salmon and their habitats by its support to the various salmon game fishing related activities. Finally for the animal welfare group my judgement will, as in connection with the life support food values, be that they have a weak ethical record if they strongly will promote restrictions in fishing or ban it completely. But again their record is strengthened when focussing on the vegetarian argument.

Comparing then the ethical record of the Norwegian salmon farming industry with the prosecutor groups, my judgement is that it in the local Norwegian context should be ranked higher than for the wild salmon group. This is simply because the purely economic value created by salmon farming is much higher than those created by or potentially may be created by wild salmon related activities. In the global context the salmon farming industry might also get a high rank if it is capable of contributing to alternative and increased income and employment also in development countries. If not, their ethical record will be ranked low.

**Particular inner worth – prosecutor groups**

Finally for the judgements of ethical records in relation to particular inner worth where the focus is on wild salmon and their habitats, the ethical record of the wild salmon group will be ranked high. Lowest ranking of ethical records among the prosecutor groups is for the animal welfare group due to their critics to fishing. The environmental group and the scientific group will also be ranked to have a high ethical record based on their general concern about long-term conservation and ecological stability of species and ecosystems.
Comparisons of ethical records in relation to particular inner worth is difficult because of the
great variety of valuations where such as traditions and local identities often are decisive for
the judgements of the ethical records. Nevertheless, I believe my judgement of a strong ethical
record of the Norwegian salmon farming industry if it contributes to the cultural flourishing of
the many instead of the few is defendable. This means further that it is defendable to rank the
industry at least on level with or even higher than the wild salmon group if considering the
wide range of values behind biodiversity as the basis for the judgement of ethical records.

Concluding remarks – most serious accusation, substitutes, trade-off
After these judgements of the prosecutor groups’ ethical records and how they relate to the
ethical records of the salmon farming industry I have three concluding remarks. The first is
that the ethical records of the prosecutor groups’ activities and agendas in general, as I
perceive it, not necessarily are stronger than the ethical records of the salmon farming
industry’s activities and agendas. One exception is the question of local fish supplies in
development countries and the question of whether fish farming by the use of forage fisheries
resources adds to the global fish sources available for human consumption. The verdict of
guilty in relation to this is, I think, the most serious accusation against the salmon farming
industry in the context of the traditional inter-human ethics.

The other remark is that the salmon farming industry’s strength when judging their ethical
records primarily are linked with the possibilities of acquiring substitutes due to the local
income and employments created by the industry’s activities and agendas. This specifically is
the case in the judgements of ethical records related to the particular inner worth behind wild
salmon and their habitats. My position in relation to this is that none of the valuations of
particular inner worth behind wild salmon and their habitats or any other kinds of ecological
entities necessarily should have priority unless it is agreed by all or at least the majority of the
moral stakeholders. This means that the subcharge against the salmon farming industry related
to the particular inner worth behind wild salmon and their habitats on a general basis not can
be given a justified verdict unless all moral stakeholders are involved. As a consequence, if a
verdict of guilty should be given it might be required that all or the majority of the moral
stakeholders agree that the values behind wild salmon and their habitats are more important or
have more value for them than any other values behind biodiversity.
My last remark is that it in many ways seems that the question of ethical records in relation to the access to values behind biodiversity boils down to a kind of trade-off between protection and conservation of ecological entities to secure some selected values behind biodiversity on the one hand, and use of ecological entities on the other hand to create an economic bases for most people to enjoy a variety of other values behind biodiversity.

### 7.2 Hedonistic nature-environmental ethics – animal welfare

The discussion in the context of hedonistic nature-environmental ethics represents the situation where individual nonhumans are ascribed a direct moral status value less than that of humans, but still to qualify for a moral stakeholder status. The properties necessary to qualify for a moral stakeholder status in the context of the hedonistic nature-environmental ethics are, as described in Chapter 5 (Conceptual model – a primary goal), sentience and consciousness, which implies abilities to feel pain. The comfort and well-being of nonhumans with such a moral stakeholder status should thus be cared for when they are alive. Killing and slaughtering them might, however, be acceptable as long as that is done painlessly.

As also mentioned in Chapter 5 (Conceptual model – a primary goal), the question remains unresolved of whether or to what extent salmon might be sentient and conscious, and have the ability to feel pain. For the sake of the argument and on the basis of the precautionary principle, I have decided to judge ethical records on the ground that salmon might qualify for a direct moral status value in the context of the hedonistic nature-environmental ethics. This means that the Norwegian salmon farming industry is in this context responsible to care for the health and welfare of salmon as long as they are alive, and to slaughter them as painlessly as possible.

I use the terms health and welfare in the hedonistic nature-environmental ethical context instead of survival, growth and reproduction. This is because the ethical focus is on survival and growth as long as the salmon are alive in the farming pens, and that reproduction will not be a specific issue.

All the judgements of ethical records are made on the basis that farmed salmon is regarded to be a domesticated animal. Though not mentioned as a topic in the examination, I will, in
connection with the verdict, briefly mention the question of whether the judgements of ethical records in relation to salmon farming would be different if the salmon should be considered to be a wild and not a domesticated animal.

At the end of this subsection are given the judgements of the prosecutor groups’ ethical records in the context of the hedonistic nature-environmental ethics.

7.2.1 Salmon farming industry’s ethical records – wild salmon and farmed salmon

The judgements of the salmon farming industry’s ethical records in the context of the hedonistic nature-environmental ethics are about threats related to the farmed salmon’s life support needs within the biological domain. These judgements are made within the framework of the Harm Principle. This is because the focus is on the health and welfare of salmon which implies avoiding harm. This is harm that might be caused by such as the environmental conditions in the fish pens, diseases and the handling of the fish. The Norwegian salmon farming industry will be judged to have a neutral ethical record if the farmed salmon are treated well and do not suffer, and a weak ethical record if the salmon do suffer. Similar to the “safer than safe” issue in relation to food safety, it is difficult to imagine situations where the farmed salmon are “kind of happy” and “treated more than well”. If such a situation should arise, then this might be a criterion for a judgement of a strong ethical record within the framework of the Harm Principle.

Subcharge about animal welfare – threat to farmed salmon’s welfare

The subcharge related to the life values behind wild salmon as moral stakeholder in the context of the hedonistic nature-environmental ethics is as follows:

The Norwegian salmon farming industry is charged with violating the Harm Principle by threatening the universal inner worth behind farmed salmon. These are threats to the farmed salmon’s health and welfare due to such as poor environmental conditions in the pens, diseases and harmful handling.
The allegation mentioned in the examination is that farmed salmon suffer due to bad
husbandry and poor environmental conditions in the pens.

Judgements of animal welfare – the Harm Principle
If farmed salmon are exposed to any of the threats mentioned in the examination, then my
judgement within the Harm Principle is that the Norwegian salmon farming industry has a
weak ethical record. These are threats such as outbreaks of fish diseases, incidents of salmon
lice, fish density and low oxygen content in the water. Other threats concern the handling of
the salmon in connection with vaccination, sorting and transportation. If the salmon should
escape from the pens and be left alone in the open coastal water and rivers, this would
probably result in additional stress and suffering. Lastly is the risk that the salmon will
experience stress and pain in the slaughter process.

In relation to the environmental conditions in the pens, the salmon farming industry might
hold that as long as the salmon eat and grow, outbreaks of diseases and incidents of salmon
lice are kept to a minimum, and oxygen contents in pens are measured to be good, then the
health and welfare of the fish should be considered satisfactory. If this is the case, and in
addition the handling of the salmon is as gentle as possible, then my judgement is that the
salmon farming industry has a neutral ethical record for the on-growing phase.

For the density question specifically, the salmon farming industry holds that the water
volumes in the pens should be satisfactory for the fish both according to the knowledge
available and the regulations. In this connection they refer to a schooling behaviour that the
salmon seem to adapt to when living in the pens, something that is interpreted as a sign of low
stress and little aggression. If biological research can confirm that the schooling behaviour is a
sign of positive adaptation to the life in a pen, then my judgement remains that the salmon
farming industry has a neutral ethical record. If not, my judgement is that the ethical record is
weak. The question of whether schooling behaviour is a sign of positive adaptation to the life
in a pen might be linked with the question of whether farmed salmon is a domesticated animal
or not.

If using the salmon’s general appetite, growth and health conditions as criteria, then I consider
these conditions in salmon farming in general to be so good that there might be talk of having
a “happy salmon”. Though I, as mentioned, do not consider this to be a relevant description or
assessment in relation to fish health and welfare, my judgement here might even tend towards a strong ethical record.

In addition to the environmental conditions in the pens, the salmon farming industry should strive to implement the most considerate slaughter methods available. If they can document that the salmon are not stressed and do not suffer during the slaughtering process, then the neutral ethical record will be maintained.

As indicated in the examination, it seems possible that many escaped farmed salmon are unable to survive in the wild because they lack the ability to catch enough food, and thus will suffer. If this is correct, then escapes of farmed salmon lead me to judge the Norwegian salmon farming industry to have a weak ethical record.

**Verdict about animal welfare – not guilty and guilty**

The verdict about the salmon farming industry’s ethical records in the context of the hedonistic nature-environmental ethics is split in two. One is a verdict in relation to perceiving farmed salmon as a domesticated animal. The other is in relation to perceiving farmed salmon as a wild animal.

**Domesticated salmon – not guilty, but possibly guilty**

It is difficult to give a clear verdict with regard to whether the Norwegian salmon farming industry has a neutral or weak ethical record in the context of the hedonistic nature-environmental ethics. If using the salmon’s general appetite, growth and health conditions as criteria, then my verdict is that the salmon farming industry is not guilty as charged.

On the other hand, the uncertainties related to whether the salmon can feel pain, stress and discomfort due to such as fish diseases, salmon lice, fish density, vaccination, handling in general and the slaughtering process should be taken into account. Doing this with reference to the precautionary principle, my verdict tends more towards guilty.
Wild farmed salmon – guilty
If farmed salmon would have the ability to survive and flourish in the wild, the ethical defensibility of keeping them locked in pens might be questioned. This is because farmed salmon in such a situation should not be characterised to be a domesticated animal, but rather to be wild. Should I be forced to take a stand in relation to this, then I would tend towards the judgement that the whole salmon farming industry in general has a weak ethical record if the farmed salmon should turn out really to be a wild animal. The verdict would then be that the Norwegian salmon farming industry is guilty as charged and should actually be sentenced to end all the farming activities.

On the other hand, if it is right that escaped farmed salmon die due to starvation, my judgement clearly is that farmed salmon should be characterised as domesticated. This means that the salmon farming industry will maintain the verdicts I gave above.

Ethical goals regarding animal welfare – maintain neutral ethical record
My suggestion is that the Norwegian salmon farming industry should keep on working to improve salmon health and welfare. The ethical goal should be to keep a steady neutral ethical record, and also consider if it is possible to have a “happy salmon” and to achieve a stronger ethical record.

Measures for keeping account of animal welfare – improve welfare
I believe that the following measures, which all are mentioned in the examination and which have actually to a great extent been implemented by the salmon farming industry, are useful for further improvements in salmon welfare.

• Control fish diseases
• Reduce salmon lice outbreaks further
• Achieve a comfortable fish density
• Eliminate vaccination deficiencies
• Reduce handling stress during vaccination, sorting and transportation to a minimum
• Reduce stress and pain in the slaughtering process to a minimum
• Avoid escapes of farmed salmon
7.2.2  Prosecutor groups’ ethical records – wild salmon and farmed salmon

The main part of my judgements of the prosecutor groups’ ethical records is related to the wild salmon group, and salmon game fishing specifically. As far as I can see, all kinds of salmon game fishing, especially catch and release, will have problems in the context of the hedonistic nature-environmental ethics if assuming that fish can feel pain. This is not only because the salmon will suffer but also because the suffering is caused solely for the sake of the fisherman’s pleasure and sense of adventure. If it was for necessary life support purposes, it would be easier to defend ethically.

My judgement is therefore that the salmon game fishing, if compared with salmon farming, has a weaker ethical record. Firstly, and most important, this is because angling causes both pain and stress on the fish during the whole time from the fish is hooked until it is landed. This is inherently part of the game. For salmon farming the situation is different. Despite the pain and stress caused on the fish, there are potentials for the Norwegian salmon farming industry to reduce harm, and to improve the fish welfare.

Secondly, I perceive salmon game fishing to have a weak ethical record because it, as far as I know, mostly is done for the pleasure of the fishing itself and the nature experiences that follow, while the purposes of salmon farming are food production and economic profits. A response to this might be that if the game fishing is also done for the purpose of eating the fish, this is basically not different from farming for food. The judgements of ethical records should therefore be the same for salmon farming and salmon game fishing. This might be a tenable argument, especially since neither case concerns necessary food products, but rather represents a luxury for the world’s most affluent citizens.

Ultimately, however, my judgement remains that the Norwegian salmon farming industry in the context of the hedonistic nature-environmental ethics has a stronger ethical record than the wild salmon group. This is when considering the wild salmon group’s main focus and interest in salmon game fishing, especially when the catch and release is practiced.

Among the other prosecutor groups my judgement naturally is that the animal welfare group has a stronger ethical record in the context of the hedonistic nature-environmental ethics than both the salmon farming industry and the wild salmon group. For the environmental groups...
and the scientific group, the hedonistic nature-environmental ethics is of less relevance since their main concern is supra-individual ecological entities.

### 7.3 Proper nature-environmental ethics – flourishing and integrity of all ecological entities

The discussion in the context of proper nature-environmental ethics represents the situation where all ecological entities, individual as well as supra-individual, are ascribed a direct moral status value that qualifies for a moral stakeholder status. This means that wild salmon, their habitats, commercial wild fish stocks and farmed salmon all will qualify for a moral stakeholder status, and that their interests should be taken into account in ethical considerations. As mentioned in Chapter 5 (Conceptual model – a primary goal), this also involves the plants used to produce vegetable raw materials for fish feed production.

Since there were no clear indications in the examination results that supra-individual ecological entities might be perceived to have universal inner worth and qualify for a moral stakeholder status, the subcharge in the context of the proper nature-environmental ethics will be somewhat hypothetical. But still, I find it, as mentioned, worthwhile to discuss this since the ambition of the present investigation is to try to analyse the widest possible range of ethical issues related to threats to values behind biodiversity caused by salmon farming activities and agendas.

Also this subchapter ends with judgements of the prosecutor groups’ ethical records.

#### 7.3.1 Salmon farming industry’s ethical records – wild salmon, their habitats, commercial wild fish stocks and farmed salmon

The judgements in the context of the proper nature-environmental ethics are done within the Equity Principle. This means that the Norwegian salmon farming industry will be judged to have a strong ethical record if its activities and agendas have no negative impacts on the values behind biodiversity that are needed and preferred by any of the individual and supra-individual ecological entities.
Subcharge about the flourishing and integrity of all ecological entities – *threat to values behind biodiversity in general*

The subcharge related to the life values behind biodiversity as moral stakeholder in the context of the proper nature-environmental ethics is as follows:

The Norwegian salmon farming industry is charged with violating the Equity Principle by threatening the universal inner worth behind wild salmon, their habitats, commercial wild fish stocks and farmed salmon. These are the threats due to impacts from escapes, including genetically and biological interactions, salmon lice, fish diseases, pollution, area use, forage fisheries of raw materials for the production of fishmeal and fish oil, use of fossil energy, bad environmental conditions in the salmon pens and harmful handling of farmed salmon.

The allegation is that the flourishing potentials of wild salmon, their habitats, commercial wild fish stocks and farmed salmon are threatened by the salmon farming industry’s activities and agendas.

**Judgements of the flourishing and integrity of all ecological entities – the Equity Principle**

In general, it seems difficult to avoid that the salmon farming industry’s activities and agendas will have some kind of negative impacts on the ecological entities mentioned in the charge. The only possible judgement therefore within the Equity Principle is that the Norwegian salmon farming industry has a weak ethical record.

One reason, however, for why the salmon farming industry might consider it ethically acceptable to cause any negative impacts, is if the farmed salmon should be utilised as a necessary life support food source for the purpose of human survival, growth and reproduction. If restricted to this, my judgement would be that the salmon farming industry would have a neutral ethical record. Any production of farmed salmon for luxury purposes would then not be accepted. If the salmon farming industry could also document that it would be better than other food sources with regard to being efficient and contributing to a fair distribution of food, then my judgement might be that the salmon farming industry has a strong ethical record.
As it works today, this sounds rather unrealistic. Farmed salmon are, as mentioned earlier, distributed to the world’s most affluent consumers in Europe, US, Japan, South-East Asia and China. There is little in this food supply that is associated with food security and necessary life support food for the survival, growth and reproduction of humans.

**Verdict about the flourishing and integrity of all ecological entities – guilty**
My verdict is quite simply that the Norwegian salmon farming industry is guilty as charged.

**Ethical goals regarding the flourishing and integrity of all ecological entities – ecological literacy**
It is practically impossible to set ethical goals for the Norwegian salmon farming industry in the context of the proper nature-environmental ethics. The best the industry can do is to focus on the ethical goals suggested in the context of the traditional inter-human ethics and the hedonistic nature-environmental ethics.

Such a focus will, I believe, to some extent contribute towards an increased ecological literacy. The strength in and effect of ecological literacy is, as I concluded in Chapter 5 (Conceptual model – a primary goal), probably the best practical outcome in the direction of some kind of proper nature-environmental ethics that human societies so far may be able to achieve and accept.

**Measures for keeping account of the flourishing and integrity of all ecological entities – those suggested before**
As for the ethical goals, the best suggestion is to focus on the measures suggested in the context of the traditional inter-human ethics and the hedonistic nature-environmental ethics.

### 7.3.2 Prosecutor groups’ ethical records – wild salmon, their habitats, commercial wild fish stocks and farmed salmon

The consequence of the proper nature-environmental ethical position in its full and holistic meaning is not only that the salmon farming industry’s activities and agendas seem impossible to defend ethically, but that this probably is the case for most human activities and agendas, at least in the modern industrialised world. All material luxury and many cultural
activities will be ethically questionable if they in some way or another have negative impacts on ecological entities. The only acceptable activities and agendas causing negative impacts on ecological entities might be for the purpose of securing survival, growth and reproduction of humans. Living ethically well in the context of proper nature-environmental ethics seems therefore to be difficult, if at all possible, specifically considering the cultures and traditions of the societies within which the Norwegian salmon farming industry operates. The utmost and most serious consequence is therefore that it logically is more or less impossible in the context of proper nature-environmental ethics to accept human cultural flourishing.

On this background my judgement of the prosecutor groups’ activities and agendas in the context of the proper nature-environmental ethical position is that they will have a strong ethical record if all their concerns about long-term conservation and ecological stability of species and ecosystems primarily are to secure the biological flourishing of all ecological entities. This is what intuitively might be believed are the focus of the prosecutor groups’ activities and agendas. The premise for such a judgement, however, is that any game fishing or hunting, or any negative impacts on ecological entities for the purpose of luxury or cultural needs and preferences are unacceptable. Among the prosecutor groups, I believe that the environmental group and also the scientific group to some extent might support such a premise, and thus be judged to have a strong ethical record. Also the animal welfare group might be judged to have a strong ethical record. This is because the full consequences of their activities and agendas, as I see it, are that all wild animals should be secured optimal welfare and thus that all their habitats should be left undisturbed.

More questionable is the judgement of the wild salmon group. Since game fishing specifically, but also hunting are mentioned as core parts of their activities and agendas, my judgement would be that that they have a weak ethical record. If, however, the fishing and hunting interests are taken away, leaving wildlife and nature interests only to be about the aesthetic and recreational values of nature and enjoying the outdoors, then the wild salmon group might be judged to have a strong ethical record in the context of the proper nature-environmental ethics.

All together, however, I have the impression that the activities and agendas of all the prosecutor groups more or less are on the particular inner worth and purely instrumental values behind biodiversity. If so is the case my judgement is that they all have a relatively
weak ethical records in the context of proper nature-environmental ethics. On the other hand, despite their focus on particular inner worth and purely instrumental values, their activities and agendas help, I believe, to create awareness of ecosystems’ complexities and uncertainties and ecological literacy in general. This points towards a stronger ethical record.

7.4 Final conclusions – the three ethical positions

The final conclusion starts with the comments about how the ethical records of the Norwegian salmon farming industry and the prosecutor groups relate to each other. This is done for each of the three kinds of ethical positions and also includes some comments as to how the case study contributes with input to the research questions. Then follows my main conclusions with regard to how the research questions are handled throughout the present investigation and to what extent my suggested answers to the research question should be regarded as reasonable and relevant. At the end are the concluding remarks about the role of science in relation to the issues handled in the present investigation.

7.4.1 Proper nature-environmental ethics – all have weak ethical records

The conclusion of my judgements in the context of the proper nature-environmental ethics are, as mentioned, that none of the interest groups, neither the prosecutor groups nor the salmon farming industry, in principle represent activities and agendas that qualify for a strong ethical record. One exception might be the environmental, animal welfare and scientific groups if the full consequence of their activities and agendas are taken into account, including ban on fishing, hunting and farming, as well as other utilisations of ecological entities for other purposes than to secure survival, growth and reproduction of humans. I do not believe, however, that this is a realistic option, and my judgement that all the interest groups have a weak ethical record therefore remains. One thing that might strengthen their ethical records is the extent to which their activities and agendas might contribute to knowledge and care about individual and supra-individual ecological entities, and ecological literacy in general. In principle, I believe that not only the prosecutor groups have the possibility of doing this, but also the salmon farming industry, if it chooses to do so.
With regard to the verdict that the Norwegian salmon farming industry is guilty as charged in the context of the proper nature-environmental ethics, it should be questioned, I think, whether the prosecutor groups are at all entitled to charge the salmon farming industry in this context. This is because their own weak ethical records entail that they themselves have a lot to be called to account for.

This conclusion supports my suggested answer to the research question of “Sustainability for whom?”, where I say that I find it difficult in practical ethics to talk about moral stakeholder status of ecological entities. This is demonstrated by the practical consequences that follow from it. The most serious consequence, I say, is that it logically is more or less impossible in the context of proper nature-environmental ethics to accept human cultural flourishing.

### 7.4.2 Hedonistic nature-environmental ethics – the wild salmon group has the weakest ethical record

My conclusion in the context of the hedonistic nature-environmental ethics is that the animal welfare group has a strong ethical record while the wild salmon group has a weak. For the Norwegian salmon farming industry my judgement is that they have a strong ethical record if the farmed salmon is perceived to be a domesticated animal. In this case I believe that the ethical record can be close to the strong record of the animal welfare group if the salmon farming industry uses all means available to care for the salmon’s welfare. If the farmed salmon should be perceived to be wild, then the salmon farming industry’s ethical record certainly will be weaker than the record of the animal welfare group. On the other hand, my judgement is that the salmon farming industry under any circumstances, whether the farmed salmon is perceived to be domesticated or wild, has, by the current husbandry practices in salmon farming, a stronger ethical record than the wild salmon group. I consider catch and release practices in salmon game fishing as the worst case in this sense.

This means, I think for the sake of fairness, that the only one of the prosecutor groups entitled to make a charge against the salmon farming industry in the context of the hedonistic nature-environmental ethics is the animal welfare group.
Also this conclusion supports, I think, my suggestion of answers to the research question of “Sustainability for whom?” where I question the practical consequences. This time, however, since the direct moral duties are restricted to some ecological entities while alive, the duties are easier to handle in practice.

7.4.3 Traditional inter-human ethics – *the salmon farming industry has a weak ethical record in relation to food equity*

Finally, with regard to the five subcharges in the context of the traditional inter-human ethics, one of my conclusions is that the most serious verdicts of guilt are in relation to the artisanal fisheries and the total supply of fish worldwide. These are the threats that forage fisheries may pose towards the artisanal fisheries, and the case that salmon farming does not really add to the total world supply of fish. In essence this is about the global equity and fairness in the access to food. Here my judgement is that the scientific group and to some extent the environmental group have a strong ethical record. Also the animal welfare group has a strong ethical record if it aims at optimal food production by focusing on vegetable food. The activities and agendas of the wild salmon group, however, just like the salmon farming industry, contribute little to the supply of necessary life support food.

Except for the judgements related to the food equity issues, there is little in the other judgements demonstrating that the prosecutor groups in general have stronger ethical records than the salmon farming industry in the context of the traditional inter-human ethics. These judgements are to a great extent dependent on the perceptions of particular inner worth behind biodiversity. This primarily involves judgements related to the values behind farmed salmon as purely instrumental economic values, which can indirectly create access to a variety of substitutes of particular inner worth, versus the cultural and traditional local perceptions of the particular inner worth behind wild salmon and their habitats, specifically related to game fishing. No general conclusion can therefore be given to whether the wild salmon group, any of the other prosecutor groups or the Norwegian salmon farming industry should be judged to have the strongest ethical record.

Therefore, except for the food equity issues, I will question, as in the context of the proper nature-environmental ethics, whether any of the prosecutor groups are really entitled to make
a charge against the salmon farming industry in the context of the traditional inter-human ethics. This is primarily due to the variety of perceptions with regard to the particular inner worth behind biodiversity, which in the end also should be added with the great variety of values behind cultural entities that modern people value. In this situation the judgements of ethical records will depend on whether the moral stakeholders basically prefer roads and coffee bars, or parks and cultural landscapes, or wilderness and pristine nature.

This demonstrates the situation referred to in connection to the research question about moral duties where I in my suggested answer say that the judgements of ethical records in the context of the traditional inter-human ethics only involve indirect moral duties towards ecological entities. These are then the moral duties limited to human’s needed and preferred values behind biodiversity.

7.4.4 Research questions – main conclusions

The observations from the case study, together with the concluding remarks about the research questions given in Chapter 3 (Method – a post-normal science approach) and Chapter 5 (Conceptual model – a primary goal), represent my main conclusions with regard to the research questions. They represent the synthesis of what I refer to as the web of observations and reflections through which the reasonableness and relevance of my suggested answers to the research questions should be qualified, elaborated and supported. It should be recalled that this implies that the suggested answers are based on a web of observations and reflections both before, in the planning of and actually also during the investigation process, and therefore might be seen as preannounced statements of my conclusions or as hints of what the discussions in the present investigation turn around. In this connection I explain that since my suggested answers are influenced by the investigation itself, there should be no surprise that I will in general conclude, as shown in the following, that my suggested answers are both reasonable and relevant. The outcome is therefore rather to show how and why my suggested answers to the research questions might be seen as reasonable and relevant.

Starting with the research question of “Sustainability for whom?”, my conclusion then naturally is, as addressed in my suggested answer, that though it is theoretically and philosophically the case that some and even all ecological entities may qualify for a moral stakeholder status, it is difficult, if at all possible, to fully apply this in practice. Probably the
best observation in relation to this is when I say that because of all the reservations and modifications referred to in the discussion of the different philosophical theories, I find it difficult in practical ethics to talk about the moral stakeholder status of ecological entities. The proper nature-environmental ethics are especially problematic, I say, because there probably will be few ecological entities available to support human cultural flourishing if available goods and resources should be shared on an equity basis between all ecological entities. This is also demonstrated by the discussion in the case study. I therefore end up saying, as indicated in my suggested answer, that the traditional inter-human ethics represents the situation which I perceive as the most practical position to take.

As a moderation of this it might be said that the hedonistic nature-environmental ethical position should be considered as being practically feasible. However, even this position creates practical problems for human cultural flourishing. If the well-being of such as sentient animals should be properly handled, I see problems for hunting traditions. The situation will be even more problematic for commercial and game fishing if fish turns out to be a sentient animal. Due to this I therefore tend to stick to my conclusion that I perceive the traditional inter-human ethics to represent the most practical position to take. It should in addition be kept in mind that traditional inter-human ethics, as described, includes concern for all the value types of the particular inner worth value category. I think in this connection specifically of the aesthetic, symbolic and religious value types which might involve the handling of nonhuman lives. Examples of this are when Saugstad says that humans have emotions directed against the destruction of life, and Korsgaard says that we might have duties with regard to plants and other beautiful things in nature. Finally, it should be noted that a wise practicing of traditional inter-human ethics of course includes respect for fellow human beings who might have taken some kind of nature-environmental ethical position.

Continuing with the research question of “Sustainability of what?”, the discussions show both from the theoretical and the practical side that the characteristics of values behind biodiversity with regard to needs and preferences both for humans and for ecological entities are of the biological kind to secure survival, growth and reproduction. This is, as I say in my suggested answer, about purely instrumental values such as food, water and shelter. For human flourishing there are in addition values behind biodiversity of the cultural kind. This involves, again as said in my suggested answer, such values as adventure, recreation and aesthetics. Most explicitly and extensively this is demonstrated by the description of the flourishing
matrix in Chapter 3 (Method – *a post-normal science approach*), with the listing of values behind biodiversity of interest for human flourishing, and by the practical examples in the case study.

In relation to the two research questions of “Sustainability for whom?” and “Sustainability of what?”, I will add that the particular inner worth value category more or less works as I had expected and hoped. This is by helping to clarify the distinctions in values behind biodiversity embodied in these two research questions, and thus also helping to avoid the use of undefined buzzwords. I add that I do not see the particular inner worth value category as the only way of achieving this, but that I see it as one feasible way. Embedded in this is that I am open for critical comments to my idea of particular inner worth, and would appreciate a further discussion both of the usefulness of such a value category and the logical or conceptual basis for it.

Then lastly, in relation to the research question about moral duties, I believe that the relevance of distinguishing between direct moral duties and indirect moral duties should be well demonstrated, also here both theoretically and practically. This is addressed already in Chapter 3 (Method – *a post-normal science approach*), where I with reference to Wetlesen introduce the term “direct moral status value”. From the theoretical discussion I conclude that if ecological entities qualify for a moral stakeholder status, then humans will have direct moral duties towards these entities’ needed and preferred values behind biodiversity. These are the duties both to avoid harm and to secure equity for the ecological entities. With regard to indirect moral duties it should be well demonstrated in the case study that humans in the context of the traditional inter-human ethical position have indirect moral duties towards ecological entities in the sense of moral duties linked to humans’ needed and preferred values behind biodiversity.

Part IV (Epilogue – *so what?*) contains further concluding reflections about topics addressed by the three research questions. My final conclusion in Part IV (Epilogue – *so what?*) is that the most fruitful focus at this stage of the human cultural development is on traditional inter-human ethics, based on equity and fairness, both for current and future generations. This then boils down to the question of a balance between the fulfilment of humans’ flourishing potentials and what the Earth can tolerate.
7.4.5 Role of science – main conclusion

I found that a reasonable conclusion about the role of science is a continual effort to search for knowledge both of what we know and what we do not know about ecosystems. This is based on recognitions such as those saying that scientific analysis should be ongoing so that chosen actions are subjected to review and that some degree of stability and thus sustainability may occur despite the uncertainties with regard to ecosystem processes. Important in this connection is that science needs to take into consideration the value grounds of the societies when producing and delivering biological knowledge. It is therefore said that the value bases of scientific activities need to be disclosed and that a scientist’s personal values should not be confused with the scientist’s empirical work. Weiner warns in this connection against privileged knowledge and says that it is important when appealing to science to be explicit about underlying moral and political agendas, while Robertson and Hull warn against an attitude among environmental scientists saying that things would be better if only we could educate the public. This links, I say, to my concern with regard to avoid buzzwords and the risk that mixing of biological facts and values might be detrimental to an upright and honest debate or discourse in the field of the environment.

The conclusions made about ecological literacy point towards the role science may have in creating value attitudes. If it is in fact the case that science can, through ecological literacy, influence value attitudes, including world views and ethics in the field of the environment, this emphasises the responsibility scientists have, I say, in separating the knowledge they present from their own value basis. At the same time I think it is important that scientists are aware of and also enforce the role science may play in relation to creating ecological literacy as a basis for attitudes, world views and ethics in the field of the environment.

7.5 Practical recommendations – issues for ethical environmental accounting

This is the subchapter with the practical recommendations which I believe represent the most interesting part in the conclusions of the present investigation when viewed from the perspective and interests of the Norwegian salmon farming industry. It is in this subchapter I make my practical recommendations regarding certain prioritised issues I believe are
important for the Norwegian salmon farming industry to focus on when developing systems for ethical environmental accounting. I describe this as a kind of practical wrapping up of the case study and a synthesis of practical consequences that follow from the theoretical discussions in Parts I and II of the present investigation.

In the following I present six recommendations of issues for the Norwegian salmon farming industry to focus on. The first involves a principal and conceptual question about the choice of an ethical position as the basis for judgements of ethical records. The other five recommendations are more practical and specific. The first two of these five I regard as the absolutely most important recommendations because one is about equity and fairness in access to food, and the other is about the total global food supply. The equity and fairness issue is triggered by the threat that forage fisheries might represent to local artisanal fisheries, while the total global food supply issue is triggered by the allegation that the Norwegian salmon farming industry reduces rather than increases the global supply of fish.

The final three recommendations are about food safety, handling of values behind biodiversity of the particular inner worth value category, and animal welfare.

For each of the issues I give a critical statement followed by the recommendations. At the end of this subchapter I make some reflections about disagreements to my critical statements and practical recommendations.

**The first recommendation – choice of ethical position as the basis for ethical judgements**

First then is the recommendation, which I regard as principal and conceptual, about the choice of ethical position as the basis for the judgements of ethical records.

**Critical statement – buzzwords and pretended nature-environmental ethics**

The critical statement relates to the use of buzzwords and pretended nature-environmental ethical argumentation, since I believe that this might be detrimental to an upright and honest debate or discourse in the field of the environment. This is a criticism directed more towards pressure and interest groups of the kinds selected for the case study than to the Norwegian salmon farming industry. For the Norwegian salmon farming industry this critical statement is rather meant as a warning.
Recommendation – *focus on traditional inter-human ethics*

My recommendation is that the Norwegian salmon farming industry should primarily focus on ethical records in the context of traditional inter-human ethics. The industry should clearly and explicitly address this principal and conceptual basis for their ethical judgements. This is because of the practical difficulties I hold follow from the ethical positions where ecological entities are ascribed a direct moral status value that qualifies for a moral stakeholder status. These are difficulties which I in the utmost consequence of proper nature-environmental ethics describe as logically more or less impossible to handle if human cultural flourishing is still to be accepted. This is because, as I conclude in Chapter 5 (Conceptual model – *a primary goal*), there probably will be few ecological entities available to support human flourishing if available goods and resources should be shared on an equity basis between all ecological entities.

I do, however, recommend the inclusion of the hedonistic nature-environmental ethical position when considering ethical goals in relation to the welfare of farmed salmon. This is on the basis of the precautionary principle, in case it should turn out that fish might be a sentient animal. In essence I actually regard this latter part of the recommendation more as a question of market acceptance than as a purely ethical question related to universal inner worth of salmon and a moral stakeholder status.

The second recommendation – *equity and fairness in access to food*

The second recommendation is about equity and fairness in access to food triggered by the threat that forage fisheries represent to local artisanal fisheries.

Critical statement – *threat to artisanal fisheries*

I am critical of what I perceive as a combination of ignorance of, disregard of and lack of admitting the risk that the activities and agendas of the Norwegian salmon farming industry might represent a threat to local artisanal fisheries in developing countries. This is a criticism of the Norwegian salmon farming industry in general. Due to the complexity of this issue, my criticism is also directed towards fisheries and aquaculture research institutes such as the Norwegian Fishery and Aquaculture Industry Research Fund (FHF) and Fiskeriforskning, and towards the Research Council of Norway.
Recommendation – *clarification is imperative*

The allegation in this connection is that forage fisheries reduce the fish stocks which the local artisanal fisheries are dependent on, and by that threaten the local catches and local access to fish. If this allegation is true and the result is reduced access to necessary life support food sources, reduced income and reduced employment for poor people living in developing countries, such as in Chile, Peru and Brazil, then I regard this as very critical and as the most serious ethical issue for the Norwegian salmon farming industry to handle. Since there is no clear evidence in the examination material showing that there are clear and direct cause and effect relations between forage fisheries for raw materials to salmon feed production in Norway and reduced harvest in artisanal fisheries, I admit that it is difficult to make any final judgement of ethical records in relation to this.

However, due to the precautionary principle, I maintain the judgement of a weak ethical record until the Norwegian salmon farming industry is able to present reliable scientific documentation showing that they despite all do not cause reduced harvest in artisanal fisheries. I see the judgement of a weak ethical record also in the light of the possibility that the salmon farming industry by its supply of luxury food to the world’s most affluent people may help maintain or even increase the unfair global distribution of and access to basic life support food sources. My recommendation is therefore that the industry recognises this issue and attempts to sort it out. This means to use resources and investigate to what extent there might be a cause and effect relation between forage fisheries for fish feed raw materials and reduced harvest in artisanal fishing. If there are such cause and effect relations the industry should do whatever possible to eliminate all negative impacts.

The Norwegian salmon farming industry should at least initiate a process to provide reliable documentation and initiate research about the allegations in relation to reduced artisanal fish catches in developing countries. The reason why my criticism is also directed towards fisheries and aquaculture research institutes and the Research Council of Norway is the complexity of this issue. I believe the handling of the issues requires these institutions to be heavily involved in a foresighted and long-term funding and commitment.

I believe it would be wise to investigate this matter by use of the post-normal science approach and the ideas of participatory processes.
The third recommendation – the total global food supply

The third recommendation is about the total global food supply issue, triggered by the allegation that the Norwegian salmon farming industry reduces rather than increases global supply of fish.

Critical statement – threat to the global fish supply

Again I am critical of what I perceive as ignorance of, disregard of and lack of admitting the risk that the activities and agendas of the Norwegian salmon farming industry might represent a serious threat. This time it is about a threat to the world fish supplies. In addition to the Norwegian salmon farming industry in general, my criticism is also this time, due to the complexity of the issue, directed towards the fisheries and aquaculture research institutes and towards the Research Council of Norway.

Recommendation – also imperative to have a clarification

One reason for the allegation that the industry reduces rather than increases the world fish supply is that 4 kg of raw fish is needed to produce 1 kg of farmed salmon. Another reason is that the demands for fishmeal and fish oil may result in overfishing. The result of this might be that the forage fisheries take the food from the commercial wild fish stocks and thus threaten them. On the other hand, the Norwegian salmon farming industry claims that they so far have not put increased pressure on fishing and that farmed salmon actually utilises forage fish better than wild fish, and therefore gives better yields. They refer to the calculations showing that 10 kg of raw capelin eaten by wild cod gives 0.7 kg edible filet, but if used for salmon feed would give a production of 3.0 kg edible salmon filet. This supports the strategy of fishing down the food web to catch forage fish and even krill, since that might give more protein yields than fishing commercial wild fish stocks. Added to this is also that the salmon farming industry utilises fishmeal and fish oil better than most other usages, and that they provide better nutritional value than the traditional use.

But despite these addressed advantages, the uncertainties attached to them entail that I, in the light of the risk that the industry may reduce the world fish supplies, recommend a more thorough investigation into this matter. As for the artisanal fisheries, I recommend that the Norwegian salmon farming industry should at least provide reliable documentation and initiate research about the allegations that they reduce rather than increase the world fish supply. Again I hold that the fisheries and aquaculture research institutes and the Research Council of Norway should initiate research into the allegations.
Council of Norway because of the complexity of this issue should be heavily involved in a foresighted and long-term funding and commitment.

Due to increased focus on vegetable raw material for fish feed production, this third recommendation should actually be seen in the wider global context of food production and food supply. This means that the Norwegian salmon farming industry also has to engage in questions related to such as the use of fossil energy, genetically modified organisms and pesticides in agriculture, as well as area use and threats to the tropical rain forests.

Also in this connection I believe it would be wise to investigate this matter by use of the post-normal science approach and the ideas of participatory processes

**Halfway comments – the recommendations so far are fundamental**

The complexity and uncertainty of the ethical challenges involved in the two recommendations about equity and fairness in access to food, and the total global food supply combined with their importance entail that I regard this to be in reality more than enough for the industry to engage in and to get a grip on. This does not mean that I will not encourage the Norwegian salmon industry to also focus on other ethical challenges. It is rather that I believe that despite any strong ethical records in relation to other kinds of issues, the challenges related to artisanal fisheries and the world fish supply are so fundamental that they need to be clarified and solved before any neutral or strong ethical record can be given to the Norwegian salmon industry as a whole.

But still, in order to make my list of recommendations more complete, I will add the other three issues, which I also perceive as important.

**The fourth recommendation – food safety**

The fourth recommendation is about food safety.

**Critical statement – lack of transparency**

I am critical of what I perceive as reluctance in the Norwegian salmon farming industry of being completely transparent in relation to all aspects of food safety.
Recommendation – *full transparency*

I say in connection with food safety that despite all the rules and regulations set by the authorities, and demands set by wholesale, buyers and retailers, there are diverging perceptions in society and among consumers on what safe food is. This is especially so with regard to GMO, which tend more to be a market acceptance issue than a factual food safety issue. Due to this I say further that the Norwegian salmon farming industry has a special responsibility for being transparent with regard to production processes. This is because I believe it is ethically good or correct to let the consumers have all information available that make them capable, on the basis of their own perceptions of food safety, to decide on whether they perceive farmed salmon to be safe to eat or not. This is even if the customers’ perceptions should build on such as feelings, scepticism or unfounded opinions. They should anyhow have the right to know exactly what they are offered and to choose on that basis. My recommendation is therefore that the Norwegian salmon farming industry should be transparent in this matter and disclose all the information that is necessary for customers themselves to decide whether they regard the farmed salmon to be safe to eat or not.

Added to this should be that if the produced salmon have qualities that are different from wild salmon or from what is expected from a farmed salmon, and thereby actually appear as a different kind of fish or food source, then it should be marketed under a different name. This should then be a name that does not give associations and expectations related to wild salmon. By different kind of food source I think both of taste, texture and nutritional qualities.

The fifth recommendation – *the particular inner worth value category*

The fifth recommendation is about the handling of values behind biodiversity of the particular inner worth value category.

Critical statement – *avoidance of buzzwords*

Just like for the choice of ethical position as the basis for the judgements of ethical records, the criticism related to the handling of values behind biodiversity of the particular inner worth value category is about buzzwords. The criticism is therefore, like the first one, primarily directed towards such as the prosecutor groups in the case study, while it for to the Norwegian salmon farming industry represents a warning.
Recommendation – sort strictly between purely instrumental, particular inner worth and universal inner worth

The values behind biodiversity of the particular inner worth value category are, it should be recalled, such as the recreational, aesthetic and symbolic values which probably vary both within and between different societies and communities, and therefore are the source of different kinds of controversies. The controversy between the wild salmon group and the Norwegian salmon farming industry represents specifically an example of this. More generally these are often controversies related to pollution and area use, which need to be handled, as I see it, in the same manner as for all other kinds of local and regional controversies about conflicting human interests.

My recommendation is therefore that the Norwegian salmon farming industry approaches controversies related to such as wild salmon, pollution and area use by trying to sort out if some of the parties involved base their arguments on any kind of proper or hedonistic nature-environmental ethical positions. In this connection it is important to be aware of possible buzzwords used by any of the parties. If buzzwords are used, the parties using them should qualify what they mean. This is to reveal whether they base their arguments on proper or hedonistic nature-environmental ethical positions or if the arguments are in reality restricted to traditional inter-human ethics. Using the terminology of the present investigation this means to find whether the controversies involve values behind biodiversity of the purely instrumental and particular inner worth value category only, or if the universal inner worth value category is also involved. To do this it is again natural for me to recommend the use of participatory processes, where hopefully some of the ideas of and results from the present investigation might be useful.

Further, for the handling of the controversies, I would recommend that both the Harm Principle and the Equity Principle are used in the judgements of ethical records. For the Equity Principle I further advise that both fair distribution and substitutability be taken into account in the judgements.

The sixth recommendation – animal welfare

The sixth recommendation is about animal welfare questions. This issue I recommend to be handled in the context of hedonistic nature-environmental ethics.
Critical statement – *fish and feelings* is not the main issue

This time the recommendation is more to motivate efforts in relation to animal welfare than really a criticism of how the Norwegian salmon farming industry handles the salmon. I am, however, critical of using research funds allocated to the question of whether fish can feel pain or not.

Recommendation – *focus on animal welfare due to market demands and the precautionary principle*

There might be good reasons to perceive farmed salmon as a moral stakeholder in the context of the hedonistic nature-environmental ethical position. However, as mentioned already, I must admit that my main reason for a focus on animal welfare is about securing market acceptance. This is because the far-reaching consequences of the hedonistic nature-environmental ethical position for all kinds of fish handling, whether game or commercial fishing, is currently too complicated to be handled to its full extent in the societies where the Norwegian salmon farming industry operates[^37]. I therefore see this as an ethical issue primarily in the context of traditional inter-human ethics, but added with the ethical dimensions of the hedonistic nature-environmental ethical position.

Issues mentioned that need careful considerations in relation to the welfare of farmed salmon are the environmental conditions in the pens, oxygen contents, outbreaks of diseases, incidents of salmon lice, fish density, schooling behaviour, appetite, handling stress by vaccination, sorting and transportation, vaccination deficiencies, slaughter methods, suffering of escaped farmed salmon and whether farmed salmon should be regarded as a domesticated or wild animal.

At the current stage of the search for improvements in the judgements of the Norwegian salmon farming industry’s ethical records I think the abovementioned practical welfare issues are worthwhile to focus on. These are more important I would contend, than to search for answers to the philosophical questions of whether fish can feel pain or not. I perceive the precautionary principle alone as strong enough for investing efforts in handling the practical

[^37]: See my questions about wild salmon versus the minnow species, and animal welfare versus salmon game fishing in Chapter 8 (Values behind biodiversity – *general reflections*) in Part IV (Epilogue – *so what*?).
animal welfare issues. Adding the market demands in this field, the motivation should be even stronger.

As for my other recommendations I think it would be wise of the Norwegian salmon farming industry to use efforts in systematically investigating the addressed questions related to the welfare of farmed salmon. If it should turn out that fish really is a sentient animal and that hedonistic nature-environmental ethics should be applied for all kinds of fish handling, I believe that the Norwegian salmon farming industry, if it sorts out and manages to handle all the addressed issues, has a fairly good change to be judged to have a stronger ethical record than many other kinds of fish handling activities.

**Agree or disagree with my critics and recommendations – participatory processes**

I fully accept that there may be objections to my critical statements and my practical recommendations. Though I base my statements and recommendations on the examination material, as well as on my own personal experiences and perceptions from 20 years in the Norwegian fish farming industry, my focus on the post-normal science approach entails that I certainly realise that my investigation alone cannot give a mutually accepted conclusion. Precisely because of this, and thereby despite any disagreements, I will urge the industry and the research institutions to seriously engage in the addressed issues and test my critical statements and practical recommendations. This should be done by searching for facts and values through a post-normal science approach combined with value and perception surveys and hearings involving broad participation by relevant moral stakeholders.

Linked to this I at the end would like to refer to my belief and motivation for doing the present investigation. This is, as I say in Chapter 1 (Introduction – research area), that the Norwegian salmon farming industry might be able to develop into a prototype of tomorrow’s environmentally and socially responsible industry – if it wants!
Part IV: Epilogue – so what?

Part IV gives as a general synopsis of the present investigation some final reflections on values behind biodiversity. These are all reflections related to the research questions.

Three questions are discussed. They are about cultural landscapes versus salmon farming impacts, wild salmon versus the minnow species, and animal welfare versus salmon game fishing.
8. Values behind biodiversity – general reflections

For those who follow my hint in Chapter 1 (Introduction – research area) to read the epilogue before reading the whole investigation, some explanations of terms might be necessary. These are terms used and explained in the previous chapters. Those who have read these chapters can go straight to the three questions.

The three questions will be discussed in the context of two different kinds of ethical positions. On one side are traditional inter-human ethical positions, which are about ethics between humans only. On the other side are nature-environmental ethical positions, which are about ethics involving ecological entities. By ecological entities I mean such as nonhuman organisms, species, communities and ecosystems.

The split between the two kinds of positions is based on a sorting of ecological entities into those that are valued instrumentally as means to other ends and those that are valued non-instrumentally as ends in themselves. This means that ecological entities in the context of traditional inter-human ethical positions are valued instrumentally only, while they in the context of nature-environmental ethical positions also are valued non-instrumentally.

I distinguish between two kinds of nature-environmental ethical positions. One is proper nature-environmental ethical positions, which means that all ecological entities are valued non-instrumentally. The other is hedonistic nature-environmental ethical positions, which restricts non-instrumental valuations to sentient and conscious animals only.

Ecological entities that are valued non-instrumentally as ends in themselves I describe as having a universal inner worth. The instrumental valuation of ecological entities I divide in two value categories which I term “purely instrumental” and “particular inner worth”. I say that ecological entities have a purely instrumental value if they are valued economically or as life support sources such as water, food and shelter to secure biological flourishing. The biological flourishing refers to securing human survival, growth and reproduction. On the other hand I say that ecological entities have a particular inner worth if they are valued as sources for securing human cultural flourishing. Examples of this are such as recreational, aesthetic and symbolic values behind biodiversity. These particular valuations vary from person to person similar to how it is for works of art.
8.1 **Three questions – cultural landscapes, minnow\textsuperscript{38}, game fishing**

The final reflections about values behind biodiversity are all related to the research questions. These reflections which might be seen, I say, as a general synopsis of the present investigation, are based on the following three questions.

**Cultural landscapes versus salmon farming impacts**

On what ethical grounds might it be fair that the negative impacts of agriculture on original or primary terrestrial ecosystems, which has resulted in the formation of cultural landscapes, are accepted, while at the same time salmon farming and its negative impacts on aquatic ecosystems are not?

**Wild salmon versus the minnow species**

On what ethical grounds might it be fair that a government committee, like the Norwegian Wild Salmon Committee, is appointed in an effort to secure the wild salmon’s future existence, while at the same time the minnow is perceived as a threat that should be combated?

**Animal welfare versus salmon game fishing**

On what ethical grounds might it be fair to be concerned with the animal welfare of domesticated animals, such as farmed salmon, while at the same time salmon game fishing is accepted?

8.2 **Three answers – nature-environmental ethics?**

My answers to the three questions serve two purposes. One is to demonstrate how dependent the answers are on whether they are based on traditional inter-human ethics or on the nature-

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\textsuperscript{38} The minnow is a small carp fish living in fresh water lakes and watercourses, and was previously endemic to some parts of Eastern Norway and the Northern counties of Troms and Finnmark. The minnow has during the last hundred years been spread to most parts of Norway and is now a strong competitor to many local freshwater fish stocks (NINA 2007).
environmental ethical positions. The other purpose is to demonstrate how challenging the
nature-environmental ethical positions are in relation to well-accepted human interests.

With regard to the nature-environmental ethical positions, the two first questions are answered
in the context of proper nature-environmental ethical positions, while the last one is answered
in the context of hedonistic positions.

8.2.1 First question – cultural landscapes versus salmon farming impacts

If proper nature-environmental ethics is applied in relation to the first question about cultural
landscapes versus salmon farming impacts, then in principle any human impact or influence
on ecological entities and natural processes would be ethically wrong. This means that
maintaining cultural landscapes, which are the results of human impacts, should be just as
ethically questionable as impacts on aquatic ecosystems caused by salmon farming. If the
main concern really should be the universal inner worth of ecological entities, it sounds like a
contradiction if the efforts to protect cultural landscapes are done by fighting the natural
invasion, succession and ecological development that may occur when traditional agriculture
activities come to an end.

If traditional inter-human ethics, where ecological entities have no universal inner worth, is
applied, however, then it can be argued that cultural landscapes might represent a better
alternative for fulfilling humans’ needs and preferences. This is because cultural landscapes,
in addition to enabling a sustainable production of food, contribute with cultural values of the
particular inner worth kind such as aesthetic sceneries, interesting and beautiful biodiversity,
rustic architecture, recreational and adventurous activities, traditional events, and local and
national identities.

Salmon farming in this context is more associated with negative impacts such as escaped
farmed salmon, genetic interactions with wild salmon, salmon lice, fish diseases and
pollution. There is additionally the threat that salmon farming might represent to wild fish
stocks worldwide, due to the forage fisheries for raw materials to fish feed production, which
might ultimately threaten fish supply both locally and globally.
If salmon farming, however, could develop to be comparable with traditional domesticated terrestrial meat production with regard to sustainability and risk, then it should get a relatively stronger ethical record. But still, it would probably not receive the same value status as cultural landscapes. The salmon farming industry must realise that it will probably not be perceived as a positive contributor to beautiful, fascinating and adventurous biodiversity. This will surely not happen in the near future, I believe, and most probably never.

My concluding answer to the first question about cultural landscapes versus salmon farming impacts is therefore that the topic addressed is fair within the context of the traditional inter-human ethics. This means that I in this context regard it as fair that the negative impacts of agriculture on original or primary terrestrial ecosystems, which has resulted in the formation of cultural landscapes, are accepted, while at the same time salmon farming and its negative impacts on aquatic ecosystems are not. In the context of the proper nature-environmental ethical positions, however, this would not be fair. Maintenance of cultural landscapes would then be just as questionable ethically as salmon farming.

8.2.2 Second question – wild salmon versus the minnow species

If fish in the context of proper nature-environmental ethical positions should be regarded as having a value-conferring property that qualifies for being ascribed a direct moral status value, then wild salmon and minnow should have an equal universal inner worth. Any activities and agendas that interfere with the integrity of any one of them would therefore be ethically wrong. This means that any action or interference that would have a negative impact on the minnow species would be just as bad as any negative impact on the salmon species. This would make it difficult to defend any measures taken to reduce the distribution of or combat the minnow species. Further, if the minnow species should be endangered, then the motivation for establishing a government-approved committee to secure its future existence should be just as good as for the wild salmon.

If traditional inter-human ethics is applied, then things such as the excitement of game fishing, taking pleasure in outdoor activities, fascination of the wild salmon’s biology, enjoyment of its culinary palatability, and appreciation of income created by wild salmon-related activities might favour the wild salmon. An ethically acceptable reason for why minnow should be
combated would then be that it represents a threat to the viability of other fish stocks such as fresh water trout, which like wild salmon, are highly valued by many people.

My concluding answer to the second question about wild salmon versus the minnow species is therefore again that the topic addressed is fair within the context of the traditional inter-human ethics. This means that I in this context regard it as fair that the Norwegian Wild Salmon Committee was appointed in an effort to secure the wild salmon’s future existence while at the same time the minnow is perceived as a threat that should be combated. Again, as for the first question, this would not be fair in the context of the proper nature-environmental ethical positions.

8.2.3 Third question – animal welfare versus salmon game fishing

If it in the context of the hedonistic nature-environmental ethics should be so that farmed salmon should be treated well, their living conditions should be optimal, harm should be avoided when they are alive and slaughtering processes should be as painless as possible, then this should most probably apply for wild salmon as well. This makes all kinds of game fishing, especially catch and release techniques, ethically highly questionable. Even commercial fisheries for salmon, or any kind of fisheries for that sake, would then also have to be considered with regard to whether they are ethically acceptable.

We may in this connection try to imagine how fishing traditions would have developed if salmon or fish in general screamed and yelled when forced out of the water and landed by the fishing gear. Question marks would then certainly be put on most fishing techniques, like in salmon game fishing where angling hooks are used, and the salmon often has to fight for a long period before it is landed. If this is only done for the pleasure of the game fisher, without any kind of food supply objectives, and even, as for catch and release fishing, letting the salmon out again in the water, then the case seems to be very weak in the context of the hedonistic nature-environmental ethics.

Again, if traditional inter-human ethics is applied, then the cultural values of the particular inner worth kinds would apply. This means that the pleasure of all kinds of game fishing is ethically acceptable, while the salmon farming industry must stick to animal welfare issues due to market demands.
My concluding answer also to the third question about animal welfare versus salmon game fishing is therefore that the topic addressed is fair within the context of the traditional inter-human ethics. This means that I in this context regard it as fair to be concerned with the animal welfare of domesticated animals, such as farmed salmon, while at the same time salmon game fishing is accepted. This would certainly not be fair if hedonistic nature-environmental ethics should be applied.

8.3 Concluding remarks – traditional inter-human ethics!?

Any argumentation leaning on environmental ethics and using buzzword such as “biodiversity” to strengthen the argumentation, logically has to accept the ethical consequences that follow. These are such as those described above for the proper and hedonistic nature-environmental ethical positions. Changes in the aquatic environment caused by fish farming should then be just as acceptable as changes in the terrestrial environment caused by agriculture, the minnow should be protected on a par with wild salmon, salmon game fishing should not be acceptable and traditional fishing in general would be highly questionable. If these consequences cannot be accepted, then it should be admitted that the arguments for maintaining cultural landscapes, protecting wild salmon and practicing salmon game fishing are solely based on traditional inter-human ethics.

An appropriate question in relation to this is whether proper and hedonistic nature-environmental ethics might be applicable in any practical situation. This means to accept in full the consequences that logically follow from these positions. If not, I think it is honest to admit that it all boils down to traditional inter-human ethics. This means ethics related to needed and preferred values behind biodiversity that secures and supports human biological and cultural flourishing only.

If so, then I perceive the main ethical challenge to be about equity and fairness between humans. This means, I gather, that necessary life support needs should be taken care of first, both for current and future generations. Should any natural resources then be left for other kinds of utilisation, there should be an honest, fair and open debate about preferred cultural values of the particular inner worth value category. I think here not only of values behind
biodiversity, but of cultural values in its full extent. It might then well be that many will prefer comfortable housing, good roads, nice parks, tranquil coffee bars and other goods and services that support human cultural flourishing before wild and pristine nature. And it might also be that this might be ethically justifiable. This then boils down to the question of a balance between the fulfilment of humans’ flourishing potentials and what the Earth can tolerate. The basic ethical question will be what risks that societies are willing to take with regard to the carrying capacity of the Earth and the human needs and preferences.

At least, I believe that focus on traditional inter-human ethics, based on equity and fairness, both for current and future generations, is more fruitful at this stage of the human cultural development, than to use time and effort in practical ethics on the variety of natural-environmental ethical positions. This is in accordance with Lemons and Morgan’s synthesis of sustainability when they (1995 p.82) say that we need to define acceptable impacts of resource use on biodiversity and acceptable measures to obtain equitable improvements in social and economic well-being.

For future refinement of ethics, however, I will despite my critical comments to nature-environmental ethics encourage the philosophers to keep up challenging the traditional thinking by continuously addressing questions in the field of environmental ethics.
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