

Effects of the free electricity policy in Andhra Pradesh 2004-2013

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Summary

In this thesis I discuss the effects of the free electricity policy perceived by informed observers. The newly elected Chief Minister of Andhra Pradesh, India, Y.S.R. Reddy, implemented a policy granting free electricity for seven hours a day to agriculture in 2004. The subsidy was among the major campaign issues, and an election promise at the Assembly Election that took place in 2004. Two of the three regions of Andhra Pradesh are semi-arid and drought prone. In the years preceding the Assembly Election a prolonged drought led to acute water scarcity in farming.

Free electricity was used to pump water from electric bore-wells, and was therefore in practice a subsidy for groundwater. Researchers and farmers reported signs of increased over-extraction of water, such as declining groundwater levels. A higher demand for electricity, combined with the costs of pumping deeper, contributed to worsening electricity supplies. The proliferation of bore-wells resulted in a fierce competition for water, disproportionately affecting the small and marginal farmers. They did not have the financial capacities to sustain competitive drilling for groundwater.

There was a comparatively good supply of electricity and water for farmers who could afford bore-wells during the first five years of the free electricity policy. After the death of Chief Minister Y.S.R. Reddy in 2009, an acute leadership crisis emerged in the Congress Party. Renewed drought conditions in the state from 2010-11, together with the worsening administrative performance of the Congress party, contributed to revived sentiments in favor of a separate Telangana.

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Professor Lindberg and Dr. Arunachalam Rajagopal gave me valuable assistance in suggesting names and contacts for my interviews. The friendly help and interest of Dr. Cynthia Bantilan, Dr. Rosanna Mula, Pamela, Padmini and Diptey at ICRISAT was priceless. A special thanks to GD Nageswara Rao for accompanying me on my first trip to Aurepalle. Shankar and Kumar, the drivers, gave me very good help by taking photos for me. I also appreciate the information and advice I got from Y Mohan Rao, Sidappa, Dr. Nagaraj, Dr. Madhusudan Bhattarai, Dr. Chanda Goodrich, Padmaja and the other researchers and staff at ICRISAT.

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Oslo, May 2014

Jin Kathrine Fosli

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Abbreviations and glossary

APWALTA – Andhra Pradesh Water Land and Trees Act of 2002, for conservation and regulation of surface water, groundwater and the environment

BC – Backward Classes (lower and intermediate caste)

BJP – Bharatiya Janata Party

Bt cotton - a cotton type which showed a high degree of resistance to bollworms

Command area (ayacut) – canal-irrigated area, or area served by an irrigation-project such as a dam

CAG - The Comptroller and Auditor General

DPAP - Drought Prone Areas Programme

FC – Forward Caste (upper caste)

GDP – Gross Domestic Product

Gram Panchayat – Local unit of self-government at village or small-town level, headed by a Sarpanch (president)

Green Revolution – Agricultural experiments involving new technology to increase yields in agriculture

Kharif – The autumn crop season, or monsoon crop

Mandal – administrative unit combining a group of village councils (Panchayats). A district is comprised of several Mandals.

MGNREGS - Mahatma Gandhi National Rural Employment Guarantee Scheme

MGNREGA – Mahatma Gandhi National Rural Employment Guarantee Act 2005

MSP – minimum support prices are decided by the Government of India, granted to farmers since 1966 for selected crops to avoid dumping prices.

Non-command area (non-ayacut) – an area which is not served by a canal or irrigation project

Over-exploited – A stage of groundwater development above 100 percent. When yearly groundwater draft exceeds what can be recharged.

Rabi – The spring crop season

Rain-fed – Agriculture relying on rainwater

Rs. – Rupees

Sarpanch – President of a Gram Panchayat

SC – Scheduled Caste. SCs are subject to affirmative action, and were formerly known as Dalits, or Untouchables.

Seemandhra – Rayalaseema and the coastal Andhra region

Semi-arid zones– Commonly defined as areas of 200 to 750 millimeter annual rainfall

SGD – Stage of Groundwater Development. <70 percent is categorized safe. 70-90 percent is categorized semi-critical. 90-100 percent is categorized critical. >100 percent is categorized over-exploited.

SHG – A Self-Help Group. Andhra Pradesh is a pioneering state of self help groups, which are typically constituted of a group of financially vulnerable women.

TDP – Telugu Desam Party

TRS - Telangana Rashtra Samithi party

Telangana Bill - the Andhra Pradesh Reorganization Bill

List of interview respondents

Dr. D. Narasimha Reddy, professor emeritus, former dean of School of Social Sciences at the University of Hyderabad. Trustee of the Centre for world solidarity.

Dr. Praveen Rao, Director of the Water Technology Centre at Acharya N. G. Ranga Agricultural University (ANGRAU). Expert on cropping patterns in Andhra Pradesh, water use, irrigation efficiency and technology

Dr. Yella Reddy, Director General of WALAMTARI, a governmental institution providing technical support on micro irrigation

Dr. Gautam Pingle, professor emeritus from Centre for Public Policy and Governance, Administrative Staff College of India. Has published writings on politics and irrigation in Telangana and Andhra Pradesh.

Professor S. Galab, Director of the Centre for Economic and Social Studies (CESS). He is working on rural development, labor and credit, and farmers' suicides.

Dr. Gopinath Reddy, professor at CESS, is working on institutions and natural resource management, governance and poverty reduction strategies.

Dr. E. Revathi, associate professor at CESS, works on agriculture, farmers' suicides, land rights and gender studies.

Dr. Radkhika Cherukuri, program director and researcher at Centre for Agrarian Studies at the National Institute of Rural Development (NIRD) in Hyderabad, a government institute doing research on rural development.

Dr. V. Ratna Reddy, Director of the Livelihoods and Natural Resources Management Institute, economist who works on environmental economics, groundwater and natural resource management.

Dr. Dinesh Kumar, Director of the Institute for Resource Analysis and Policy, has published widely on groundwater management, and has comparative knowledge of responses to electricity pricing in water and electricity use in Indian states.

Mr. Rajendra Sishodia is PhD-candidate of the University of Florida / ICRISAT. He is working on groundwater availability, and has field experience working on village watersheds from the pilot project in Kothapalli.

Dr. K. Palanisami, principal researcher at the International Water Management Institute (IWMI). He is an agricultural economist, working on water and land management and water policies.

An official in Andhra Pradesh Central Power Distribution Company Limited (APCPDCL), the Central electricity distribution company (Discom) in Hyderabad.

Mr. G. Ratna Kumar, Managing Director and Vice Chairman of Andhra Pradesh State Irrigation Development Corporation (APSIDC).

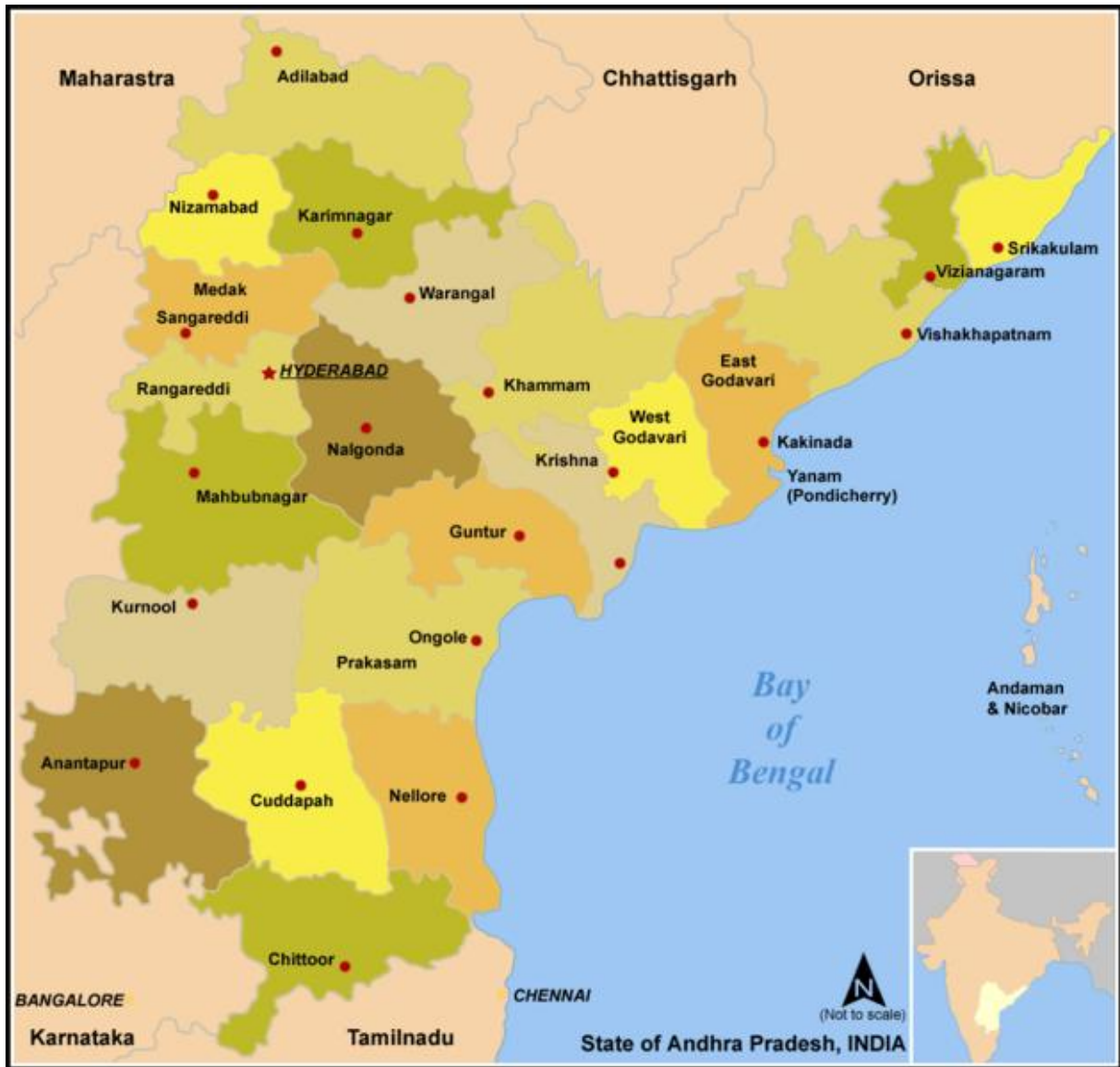
Mr. A. Ravindra, Director of the Watershed Support Services and Activities Network (WASSAN), which has a program for sharing bore-wells and works on watershed development and natural resource management.

Mr. Rama Mohan, team leader of the Sustainable Ground Water Management (SuGWM) Project. Has field experience on bore-well sharing, bore-wells in hard rock areas of Andhra Pradesh and community-based groundwater management.

Dr. Anjal Prakash, Executive Director of South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERS). He is working on groundwater management, natural resource management, gender, poverty and water supply in India.

Mr. Rahul Sen, Director of R S Development Solutions and Research Services, has worked on conjunctive use of water from canals and bore-wells, has technical and political knowledge of groundwater use.

Map 1: Districts in Andhra Pradesh¹



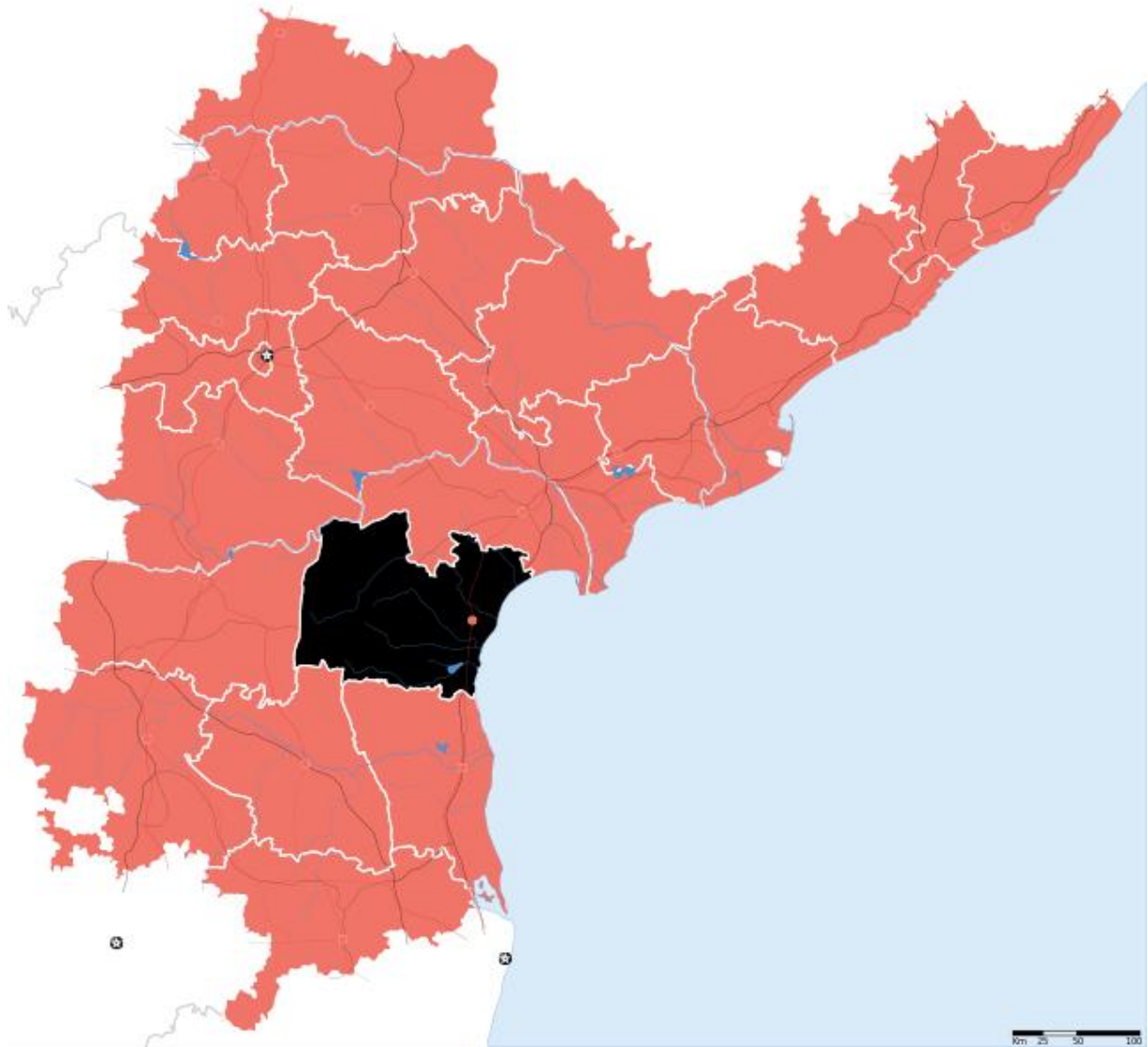
¹ Download taken from wikipedia with permission to share:
http://en.wikipedia.org/wiki/File:Map_AP_dist_all_shaded.png

Map 2: Location of Mahabubnagar District, Andhra Pradesh²



² Free download taken from Mapsofindia with written permission to publish and print:
<http://www.mapsofindia.com/maps/andhrapradesh/districts/mahbubnagar.htm#>

Map 3: Location of Prakasam District, Andhra Pradesh³



³ Haros based on map created by Planemad, granting permission to copy, distribute or modify the document freely: http://commons.wikimedia.org/wiki/File:Andhra_Pradesh_district_location_map_Prakasam.svg



Dried up tank in Aurepalle, Andhra Pradesh, 2013.

Photo: Kumar, driver, ICRISAT



The boring of a bore-well near Aurepalle, Andhra Pradesh, 2013.

Photo: Kumar, driver, ICRISAT.

1 Introduction

The subject of this graduate paper is the effects of the free electricity policy in the Indian state Andhra Pradesh between 2004 and 2013. Following the State Assembly election in 2004, the Congress party implemented free electricity for agriculture. Through interviews I conducted in 2013, I recorded opinions of how informed observers interpret the effects of the policy in selected rural areas of the state.

The policy had implications for the extraction of the limited resource of groundwater. Water for irrigation was literally vital for the farmers doing agriculture. It could be a question of life and death. Electric bore-wells and rain were generally the only sources of irrigation in the so-called *non-command areas* without access to canal water irrigation. This was opposed to canal irrigation in the so called *command areas*.

Due to over-extraction, the issue of groundwater is no longer a question of long-term sustainability, but is now a national crisis in India.⁴ As wells run dry, bore-wells will not be an alternative to surface water in rivers and lakes. This crisis is all the more urgent as groundwater makes up 60 per cent of irrigation water, and 80 per cent of rural drinking water in India. Irrigation accounts for 80 per cent of the country's total water usage.⁵

Water is already a scarce resource in India. With a limited supply, large groups are affected by the distributional policy of this resource. Such groups include farmers, who use water for irrigation, manufacturers, and ordinary citizens for domestic consumption. Responses in regions affected by drought and unstable rainfall included rainwater harvesting in tanks at the local level, and conjunctive use of groundwater and canal water in command-areas where canal water was available. River linking projects were discussed at national level, but are still to be carried out on a larger scale.

⁴ A concise description of the crisis is found in: Wyrwoll 2012, *India's groundwater crisis*, The Global Water Forum.

⁵ Government of India, Planning Commission 2011: 60.

Research questions and argument

In this thesis I analyze and discuss the effects of the free electricity policy by looking first at possible initial benefits for farmers during the first years of the policy. Respondents generally held that the electricity and water supplies decreased after 2009, the year that chief minister Y.S.R Reddy died in an accident. I will be discussing the reasons why the situation worsened after 2009. The groundwater levels declined even before 2004, because of drought and an increased spread of bore-wells, but I argue that free electricity aggravated the trend of falling groundwater levels. A bore-well was used to pump irrigation groundwater for farming, and typically run by diesel or electricity.



By the bore-well: Jin Kathrine Fosli (left), contact person of ICRISAT (second left), A Amarender Reddy (second right), GD Nageswara Rao (right) Photo: Kumar, driver, ICRISAT.

Based on the information I have from the primary sources, which are interviews, and the secondary literature, I will discuss the possible impacts from the policy in selected rural areas. One question is whether the farmers saw some initial benefits, or even lasting benefits, from the policy.

I will also be discussing how the policy may have contributed to a declining water table in some areas, and how cropping patterns may have changed as a result of a changed access to water. I will compare other alternatives and supplements to electricity subsidies for agriculture. The main period of my research will be from the policy was introduced in 2004, and until 2013.

My research questions are:

a) In the view of informed observers, what were the effects between 2004 and 2013 of the policy of the Congress party providing free electricity for agriculture?

b) How did the policy affect the supply of water for large farmers, medium farmers and small farmers respectively?

The relative importance of electricity subsidies

The Norwegian reader will most likely recognize electricity pricing as a debated issue, whether for private customers or institutional customers. Although the Norwegian electricity market was deregulated in 1990, there was still political involvement in the electricity pricing after that year. The grant of 0, 8 TWh electricity at an unknown, presumably subsidized rate to the Norwegian company Norske Skog in 2010 is one illustrative example. The grant triggered a debate about giving subsidies to non-viable companies versus helping a vulnerable company sustain livelihoods in the local society.⁶

Another OECD country, having a different system from both Norway and India, is the Republic of Korea. Their electricity company KEPCO is half governmental, and the only electricity company in Korea. Thus, the central government is deciding the tariff policy through the Ministry of Industry, Trade and Resources.

Government subsidies and interference in the electricity policy was in other words also occurring in OECD countries. When I collected data for this thesis in India in 2013, I stayed at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). During a heated debate at a seminar where I presented the data to respondents, the audience suggested that governments of industrialized countries would not interfere in the electricity policy by handing out subsidies. That is incorrect, as I have shown. Another more precise argument is that the farmers needed water for irrigation, it was not the electricity in itself which was important to the farmers. In my thesis, I will be discussing the perceived effects of the water extraction on the groundwater levels.

⁶ Nr.k.no: «Ny kraftavtale til Fiborgtangen», December 23 2013. NA24.no: «Hemmelig gigantsalg av elektrisk kraft», December 28 2010.

Technological possibilities and limits

The pumping of groundwater through electric bore-wells was made possible by new technology after the 1960s. In the wake of the so-called Green Revolution new technologies, such as electricity for irrigation and fertilizers, were brought in. The goal was to achieve national self-sufficiency of food in India. A double crop, as opposed to a single crop, was made possible through large-scale irrigation projects and the use of new technology in some parts of India.

On the other hand, ever since the British colonial government, there was a continuous neglect of Southern India's tank network, in the opinion of professor D. Narasimha Reddy.⁷ He is professor emeritus of the University of Hyderabad, and an observer of the policy. Narasimha Reddy states that before the colonial government there was village settlement along the tanks, based on old systems of common labor. The tanks were built in order to harvest the scarce rainfall, and secured water for one crop. The returns from public investment in small-scale irrigation systems was settled agriculture and a power-base for rulers who controlled the irrigation.⁸ Instead of maintaining the already existing networks of tanks, British authorities imposed rates in order to create revenues. Therefore, farmers withdrew their labor.

Narasimha Reddy's emphasis on the historical importance of tanks in Indian culture is supported by another observer, Gautam Pingle. Pingle argues that the private electric bore-wells replaced tank irrigation in Telangana.⁹ He is also arguing that south India owes the survival of its culture, religion and ritual to the economic base around "tank and temple". This is along the lines of historians such as Talbot and David Mosse.¹⁰

⁷ Narasimha Reddy in an interview, 2013.

⁸ Narasimha Reddy in an interview, 2013.

⁹ Pingle 2011: 123-130.

¹⁰ Talbot 2001: 92-125.

Diversion works were completed in the Upper Ganga Canal, the Upper Bari Doab Canal and the Krishna and Godavari Delta Systems, then later the Lower Ganga, the Mutha and Agra Canals and the Sirhind.¹¹ These projects secured downstream farmers in the lower delta areas water for two crops at high rates during British colonial government. After independence the water rates of these areas were kept at low, fixed prices. Rates were not collected for the diversion projects, which required little maintenance, at the advice of institutions such as the World Bank and the government of Andhra Pradesh before 2004.

Chandrababu Naidu and his Telugu Desam Party (TDP) led the administration until 2004.¹²

Argument of regional equity

While the downstream farmers in the canal irrigated command-areas were secured water for two crops at low, subsidized rates, the farmers of the upland areas had to rely largely on rain and bore-wells. Supporters of free electricity often argued that the upland farmers in the so-called non-command areas of the states were forced to invest heavily in bore-wells for irrigation by private means.

One alternative would have been removing water for the double crop, which was a benefit for the downstream farmers. This could have provided a sufficient amount of water for a crop for the upland farmers. That would, however, have involved removing a benefit given to the downstream farmers. The alternative was to grant an electricity subsidy, which was done in Andhra Pradesh in 2004 by the chief minister at the time, Y. S. Rajasekhara Reddy (Y.S.R).¹³

Several observers of the policy, such as A. Ravindra who is Director of Watershed Support Services and Activities Network (WASSAN) in Hyderabad, and Yella Reddy, Director of the Water and Land Management Training and Research Institute, argued that without free electricity agriculture would not have been a viable option for many of today's farmers in Andhra Pradesh.¹⁴

At the same time, other observers argued that the number of villages in the state that reached over-exploitation of groundwater increased.¹⁵ A. Ravindra refers to the effect of the policy as taking out the resource base of the poor. His concern is shared by K. Palanisami of International Water Management Institute (IWMI), co-editor of the publication *Water*

¹¹ Ministry of Water Resources.

¹² Narasimha Reddy in an interview, 2013.

¹³ Narasimha Reddy in an interview, 2013.

¹⁴ Ravindra and Yella Reddy in interviews, 2013.

¹⁵ Srinivasa Reddy and Ratna Reddy 2012: xxii.

management in the hill regions: evidence from field studies (2013). Palanisami's opinion is that some small and marginal farmers relying on bore-wells were likely to lose in cases of competitive drillings, as their risk-taking capacities were low. On the other side of the scale were the large farmers in the rain-fed areas, who could afford the investment of additional wells.¹⁶

Critics' arguments

As electricity for irrigation was provided free or practically for free in some Indian states, observers argue that farmers had little incentive to save either water or electricity. This in turn led to over-extraction of groundwater in some areas, as well as inefficient use of electricity. Due to sinking levels of groundwater, farmers had to dig deeper for water. Stronger and more efficient pumps, using more electricity, were needed in order to fetch the water from longer distances. This again aggravated the problem of groundwater and electricity supply.¹⁷

Both individual farmers and other observers of the policy argued that rather than subsidized, low-quality electricity supplied in rural areas for 4-5 hours a day, a transformation of the electricity supply to rural areas was necessary.¹⁸ Individual farmers said that they were willing to pay for a better quality of electricity supply.¹⁹ Imposing a policy of below the cost supply of electricity for irrigation was in many respects short-sighted. One reason for this is that the quality of the supply was poor, and led those who could afford it to seek additional sources of supply, such as pumps of higher capacity, but less energy-efficiency. In other words they procured equipment using more electricity.²⁰ The strain on the equipment for water extraction was also high, leading to frequent repairs and maintenance work. So the effect of the subsidy policy in many places was an inefficient use of water and electricity, contributing to shortages in the water and electricity supplies.²¹

The loss caused by uncovered subsidies according to estimates was 1.69 percent of the gross domestic product (GDP) of Andhra Pradesh in 2011-2012.²² In addition, sinking groundwater levels led to mining of underground aquifers (rocks), with disastrous impacts to

¹⁶ Interview with Palanisami 2013.

¹⁷ D'sa 2010: 1. Lindberg 1999. See for instance the conclusion at page 289-290.

¹⁸ Birner, Gupta, Sharma 2011: 150-151. Jalan 2012, «Free electricity is hurting development, not helping it – including farmers themselves», *The Times of India*, October 31 2012.

¹⁹ Birner, Gupta, Sharma 2011: 150-151.

²⁰ D'sa 2010: 1.

²¹ Rajendra Sishodia confirmed in an interview on March 29 2013 that he had seen farmers flood smaller fields.

²² Planning Commission *Annual Report 2011-12 on The Working of State Power Utilities & Electricity Departments*: 168. The uncovered electricity subsidy of Andhra Pradesh amounted to Rs. 68, 524, 600, 000 in 2011-2012, while the GDP of the state was Rs. 4050, 460, 000, 000 in 2011, according to this source. Cf. numbers from «Acute power crisis blacks out state's growth», *Times of India*, March 14 2013.

the quality of the drinking and irrigation water.²³ As a result of the extraction of groundwater from deeper wells, the water was frequently found to have higher levels of arsenic, fluoride and other harmful chemicals.²⁴

Populist promises

India's tragedy is that we continue to elect Chief Ministers who believe that short-term populist measures are more important than doing real good to the state they rule. So even as we watch Andhra Pradesh's collapse on account of idiotic policies of its government, we have Parkash Singh Badal take almost the same route in Punjab.²⁵

This comment was made by Tavleen Singh, a noted columnist, on the policy of the Badal government of Punjab, supplying free electricity to all farmers. It serves as a good illustration of common perceptions of populist policies in several states in India of supplying free or heavily subsidized electricity for agriculture. It is striking how electricity subsidies for agriculture were promised all across the political range in India. One example is the state election in 2002 in the northern state Punjab. In this election, precisely as in the 1997 elections, all parties promised such subsidies.²⁶

Reena Badiani and Katrina K. Jessoe investigated the linkages between state elections and agricultural electricity prices, with the possible use of electricity subsidies as a political tool to gain rural votes. Their estimations were based on electricity prices in the state of Rajasthan, and indicate results for the years 1997 and 2002. Both years preceded scheduled state assembly elections.

The authors wanted to test their prediction that politicians increased agricultural subsidies in the year prior to an election, with an expected reduction in electricity prices. Their findings supported this prediction, suggesting that politicians reduced the electricity prices on average by 10 percent in the year preceding an election.²⁷

²³ www.thefreedictionary.com explains aquifers as underground layers of permeable rock, sediment or soil containing water.

²⁴ See for instance: Chakraborti, Das and Murrill 2011: 27–33.

²⁵ Tavleen Singh is a columnist and reporter. The quote was originally stated in an article in *The Tribune*, although this quotation is from Dhillon 2001, again cited in Birner, Gupta, Sharma 2011: 123-124.

²⁶ Birner, Gupta, Sharma 2011: 123.

²⁷ Badiani and Jessoe 2011: 21-22.

In fact, this type of politics, labeled *competitive populism*, has its roots back to the late 1960s in India. The Swedish researcher Staffan Lindberg states that such politics were «produced» by the Tamil nationalist politicians coming to power after 1967.²⁸ They seemed to have the impression that the only way of meeting the demands of the pioneering farmers' movement was granting free electricity for well irrigation.

In very broad terms, electricity subsidies were connected to the emergence of the farmers' movement in the wake of the Green Revolution in India.²⁹ For different reasons farmers gained increased political leverage. This is not to say that they were one unified group. When I refer to the farmers' movements, this includes the middle and upper strata of the farmers in India, and emerging capitalist farmers. These movements became very important political forces in the states Tamil Nadu, Punjab, Karnataka, Maharashtra and Uttar Pradesh.³⁰

Birner et al presented evidence that the amount spent on agricultural electricity subsidies exceeded state spending on health and education in two Indian states.³¹ Growth in irrigation had its rewards, such as increased agricultural yields, lowered food prices, and an increased demand for agricultural labor that benefited landless farmers. These gains may have come at the cost of a national crisis in groundwater in India, due to the steady over-extraction.

The emergence of political interventions granting energy subsidies for pumping groundwater after the 1960s grew into a complex sector linked system in India. It was termed the «energy-groundwater nexus».³² A twofold challenge characterized policy development for the related sectors in Andhra Pradesh: Political populism guided the principles for use of energy and groundwater to agriculture, while the administrative responsibility remained fragmented among a number of government institutions.³³ Some, like the panchayats, lacked the technical and financial capacities even for building a tank. Policy-reforms in the form of direct groundwater management were generally not feasible options. As a result, policy-makers could only develop a «Plan B» of the most feasible albeit not the best alternatives.

²⁸ Lindberg 1999: 266.

²⁹ Birner, Gupta, Sharma 2011: 110.

³⁰ Lindberg 1999: 291. The author specifies the groups that are included in the new farmers' movements. Cf. Nadkarni 1987, Brass 1994, Lindberg 1994; 1995; 1997.

³¹ Badiani and Jessoe 2011: 3. The authors are referring to Birner et al 2007, but do not specify which two states.

³² For a useful introduction to the subject, see: Sinha, Bharat Sharma and Scott 2006: 242-246.

³³ Cf. Sinha, Bharat Sharma and Scott 2006: 242. See also World Bank 2010: xiii-xiv.

Andhra Pradesh

In Andhra Pradesh, electricity subsidies and a flat-rate tariff were first used as political tools in 1977.³⁴ Democracy and elections were suspended during the Indian Emergency from 1975-1977, allowing Prime Minister Indira Gandhi of the Congress Party to rule by decree. The authors Regina Birner, Surupa Gupta and Neeru Sharma point to the efforts of the Congress Party to get re-elected following the Emergency.³⁵ Electricity subsidies were used as a «pro-peasant» policy by dominant parties across the political range in Andhra Pradesh since they were first introduced.

It is interesting to note that the rhetoric used by the Congress Party before coming to power in 2004, was exactly the same as the competing Telugu Desam Party used twenty years earlier in the same state. At the time, the contesting N.T. Rama Rao of the Telugu Desam Party labeled the Congress party «pro-merchant» and «anti-peasant», justifying subsidized electricity.³⁶ Along similar lines before the State Assembly Election in 2004, Y.S.R. and now the Congress Party accused Chief Minister Naidu from the Telugu Desam Party of having overemphasized growth in the services sector, at the expense of the agricultural sector and manufacturing in the state.³⁷

Shortly after taking office as the new chief minister of Andhra Pradesh in 2004, Y.S.R. formally granted free electricity for all farmers.³⁸ Free electricity for farmers was a major campaign issue preceding the elections, and a promise made by Y.S.R. and the Congress Party.³⁹

It is important to keep in mind that there was drought in two out of three major areas in the state, Telangana and Rayalaseema, in the three years previous to the election.⁴⁰ The semi-arid zones of Andhra Pradesh are generally drought-prone, and these two regions are among the most drought-prone areas in India.⁴¹

³⁴As opposed to metering the consumption of electricity. See Birner, Gupta, Sharma 2011: 108.

³⁵Birner, Gupta, Sharma 2011: 109.

³⁶Ibid.

³⁷Cf. Price 2011: 4. The farmers of JC Agraharam in Prakasam district, Andhra Pradesh, also describe Chandrababu Naidu as having favored urban development and the IT sector, while he neglected farming.

³⁸Birner, Gupta, Sharma 2011: 116.

³⁹Price 2011: 18.

⁴⁰Ibid., p. 1.

⁴¹The semi-arid zones are commonly defined as areas with 200 to 750 millimeter annual rainfall. See for instance Singh and Ballabh 2008: 159-160. According to this source from 2008, there are 183 drought-prone districts in 16 Indian states. These are all covered in the Drought Prone Areas Programme (DPAP).

Table 1: Drought periodicity in India⁴²

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Table 6.1: Periodicity of Drought in Different Meteorological Subdivisions of India

<i>Subdivision</i>	<i>Recurrence of Periods of Highly Deficient Rainfall</i>
Assam	Very rare, once in 15 years
West Bengal, Madhya Pradesh, Konkan, coastal Andhra Pradesh, Maharashtra, Kerala, Bihar and Orissa	Once in 5 years
South interior Mysore, eastern Uttar Pradesh, Tamil Nadu and Kashmir	Once in 4 years
Gujarat, eastern Rajasthan, western Uttar Pradesh, Tamil Nadu, Rayalaseema and Telangana	Once in 3 years
Western Rajasthan	Once in 2.5 years

Source: Indian Association of Hydrologists 1988.

During this prolonged drought, however, there were reports of large numbers of suicides among farmers in the state. The suicides were connected to increased debt among farmers. Andhra Pradesh was cited as having had 385 out of 495 farmer suicides.⁴³ The farm sector was the primary source of income for around 60 percent of the population in the state.⁴⁴ During these circumstances, the Telugu Desam Party government was made vulnerable to critique by its relative lack of investments in irrigation development.⁴⁵

In his campaign speeches, Y.S.R. charged the state government of ruining the rural economy, resulting in farmer suicides. The electoral promises he made included free electricity for farmers, vastly expanded irrigation in the state and development of the agricultural sector.⁴⁶

⁴² Table from Singh and Ballabh 2008: 159.

⁴³ Price 2010: 6-7.

⁴⁴ Andhra Pradesh Human Development Report 2007: 5.

⁴⁵ Price 2011: 5- 6. The author refers to articles in *The Times of India* in November 2003 of farmer suicides.

⁴⁶ *Ibid.*, p. 11.

Structure of the thesis

In the thesis I will discuss the effects of the free electricity policy in Andhra Pradesh, which had lasted for nearly a decade when I collected material in 2013. It contains six chapters. For all practical purposes I decided not to emphasize developments after 2013, even though the policy continued to be in effect in 2014.

Chapter two contains an introduction to the major sources for this thesis, methodology and limits to the study. Chapter three, four and five constitute the main analysis, and the chapters are steered by the chronology, with a thematic structure of the sections.

In chapter three I discuss the initial effects resulting from the free electricity policy between 2004 and Y.S.R.'s death in 2009. Farmers of all sizes were encouraged by the subsidy to drill more bore-wells. There was increased agricultural growth in Andhra Pradesh from 2004 until 2010-11, but Telangana and Rayalaseema continued lagging behind the coastal Andhra region. The latter region was dominated by canals for irrigation, and free electricity may have contributed to increased agricultural growth through conjunctive use of canals and bore-wells. The policy did not, however, bridge regional disparities between the semi-arid regions and the coastal Andhra region. The agricultural growth furthermore seemed conditioned by external factors, such as good rainfall.

An increased number of bore-wells resulted in declining groundwater levels in the four test-villages, which we will see in chapter four. The entry costs and risks to newcomers went up as the groundwater levels declined. Electricity supplies generally decreased after 2009. The combination of declining groundwater levels, renewed drought and lowered electricity supplies after 2009 had a detrimental effect on agriculture. Free electricity was in reality a cross-subsidy, borne by other sectors such as the industries and the electricity sector. Farmers faced an annual rural inflation rate of 10 percent, which meant that they had no more purchasing power despite an average median growth of 7.2 percent per person in rural household income. Moreover, free electricity induced some farmers to invest more money in commercial crops because of unfulfilled expectations. The result for some of them was heavy losses. The dwindling water resources in the villages also affected the landless lower-caste people negatively. Ultimately, the solution for some of the people in the villages was migration to larger cities.

In chapter 5 I discuss the political context of free electricity for agriculture. Debt-ridden farmers in the semi-arid regions Telangana and Rayalaseema felt increasingly haunted by droughts and lack of water. Promises of free electricity and more irrigation were central

elements in Congress' election campaign in Andhra Pradesh in 2004. Y.S.R. projected himself as a protector of distressed farmers. He was able to emerge as a moral alternative to chief minister Naidu, who had emphasized urban development. Congress feared that they would have a hard time recovering if they lost the election to Naidu and the Telugu Desam Party. The campaign promises of free electricity and irrigation, and efforts to fulfill them, were motivated by the wish to gain votes. Renewed drought conditions in the state from 2010-11, together with the worsening administrative performance of the Congress party after Y.S.R.'s death, contributed to revived sentiments in favor of a separate Telangana.

Chapter 6 contains a summary and the conclusion. I discuss some of the major challenges and obstacles encountered by Indian politicians in making agriculture sustainable.

2 Sources and methods

A major source of information for this thesis is interviews with informed observers of the policy of free electricity for agriculture since 2004 in Andhra Pradesh in India. The interviews together with newspaper articles, statistical material, research literature and official sources such as the groundwater information and technical data constitute the sources. In the main part of the thesis I want to make comparisons between the information from my interview sources, and compare these accounts to the other sources I have access to.

In this chapter I will start by explaining my reasons for emphasizing the interviews. In the next section I describe the interviews and the informants, and how the informants are related to the topic. In a separate section after that I will describe the interview situation. I proceed by discussing the particular advantages and challenges in the selection of interview sources. Moving on I will discuss the interview as a method. The information from the interviews I conducted while I was in Hyderabad is supplemented by other sources. I will describe the supplemental sources and how I combine them with the interviews. In the last section of the chapter I deal with the limitations to the study. The sources are presented and discussed in the text of this chapter, and there will be no additional footnotes to it.

The number of interviews, the quality of the material and the variation of opinions are the reasons why I chose the interviews as a main source for my master's thesis. My topic is deviating slightly in its focus from the available research literature, and relevance is also an important reason for why I have chosen to emphasize the interviews. Some of the literature has a very extensive scope, comparing for instance agricultural policy reforms between Andhra Pradesh and Punjab, such as *The Political Economy of Agricultural Policy Reform in India: Fertilizers and Electricity for Irrigation* written by Regina Birner, Surupa Gupta and Neeru Sharma in 2011. Dr. Staffan Lindberg described the effects of similar policies as the current policy of free electricity in Andhra Pradesh in the research article «When the Wells Ran Dry: The Tragedy of Collective Action among Farmers in South India» from 1999, but in its neighboring state of Tamil Nadu.

By conducting the interviews I was able to narrow the thematic and geographical scope of my research, keeping the main focus of the interviews towards effects of the policy in selected rural areas, which I will be describing in this chapter. The policy is comparatively new, although it had been lasting for nearly a full decade in 2013. The existing research literature usually, but not always, extended into this period, which makes it important for me

to see if there was any major change in the policy and its effects during the period the policy had been in effect until 2013. As a master's student of history it is therefore a big advantage for me to be able to record how the effects of the policy were perceived directly through live interactions and discussions with people who saw and experienced for instance a change in their access to water through bore-wells. It helped me gaining a proper understanding of the situation, which was a necessary precondition for my analysis of the material.

From March 2 2013 until April 12 2013 I stayed in Hyderabad, which is the state capital of Andhra Pradesh. I conducted around 25 interviews with altogether approximately 60 informants during my stay. These informants are connected to a variety of institutions. Through the interviews I wanted to find out how informed observers from different institutions interpreted the effects in selected rural areas of the free electricity policy, and also discuss the political effects resulting from it.

The interviews were conducted to a large part between March 8 and April 2 2013, as I spent the first week of my stay in Hyderabad was formulating a question form. I stayed as a student intern for my research work at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad. My supervisor there, Dr. A. Amarender Reddy helped me in making interview appointments, finding additional literature and various data connected to my research, and in planning and facilitating the collection of sources. Dr. Reddy accompanied me on two field trips to Aurepalle village. Two other contacts, Dr. Staffan Lindberg from the University of Lund and his colleague in Madras Dr. A. Rajagopal, who is an expert on water management, also helped me finding relevant sources.

The informants

The first category of informants is informed observers, including politicians, in the four ICRISAT test-villages of Andhra Pradesh: Aurepalle and Dokur in Mahabubnagar district in the Telangana region, and JC Agrapharam and Pamidipadu in Prakasam district in the Coastal Andhra region.

Aurepalle is a drought-prone village in a semi-arid zone of the Telangana region. The village is located approximately 60 kilometers from Hyderabad and will serve as my main case village when discussing the effects of the policy. I will then be comparing the development in Aurepalle to the three other villages. In addition to this main village of interviewing I received written answers to questions from three other villages in the state. One, Dokur village, is also in a semi-arid zone of between 200 to 750 millimeters of annual

rainfall. The two other villages are Pamidipadu and JC Agraharam in the coastal Andhra region, located at a distance of approximately 300 to 400 kilometers from Aurepalle.

The village-level information was collected through three focus group meetings in Aurepalle, which will be discussed in a separate section, and written answers to a question form returned by the Field Investigators of ICRISAT. Using the information from the interviews I will be discussing how the policy may have affected the access to water for large farmers, medium farmers and small farmers respectively in the main part of the thesis. I will move on to discuss how the access to water has affected the cropping pattern and livelihoods in Aurepalle, and compare this with the three other villages and information from the other sources.

The second category of informants was academics and researchers. The researchers had various types of field experience, and several of them were familiar with the development in Mahabubnagar district in the years after the policy was introduced. The following informants were academics and researchers: Professor emeritus D. Narasimha Reddy, former dean of School of Social Sciences at the University of Hyderabad, Dr. Praveen Rao, Dr. Yella Reddy, professor emeritus Gautam Pingle, professor S. Galab, Dr. Gopinath Reddy, professor E. Revathi, Dr. Radkhika Cherukuri, Dr. V. Ratna Reddy, Dr. Dinesh Kumar, Mr. Rajendra Sishodia and Dr. K. Palanisami.

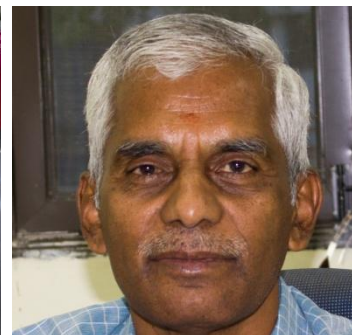
The informants of this category had quite different academic backgrounds, ranging from engineering and water technology in agriculture to more general research in economics and social studies. Four of these informants had technical knowledge connected to irrigation and water management: Dr. Praveen Rao is the Director of the Water Technology Centre at Acharya N. G. Ranga Agricultural University (ANGRAU). He had extensive knowledge of water use, cropping patterns in Andhra Pradesh and irrigation efficiency and technology.



Mr. Sishodia



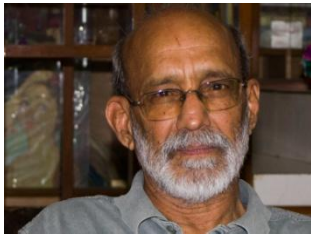
Dr. Yella Reddy



Dr. K. Palanisami

Mr. Sishodia was a PhD-candidate of the University of Florida / ICRISAT. He was working on groundwater availability, and had field experience working on village watersheds from Kothapalli. We discussed technical aspects and village level impacts from the policy.

Dr. Yella Reddy was Director General of Water and Land Management Training & Research Institute (WALAMTARI), a governmental institution providing technical support on micro irrigation. Dr. K. Palanisami is principal researcher at the International Water Management Institute (IWMI). He has been writing about water management in the hill regions.

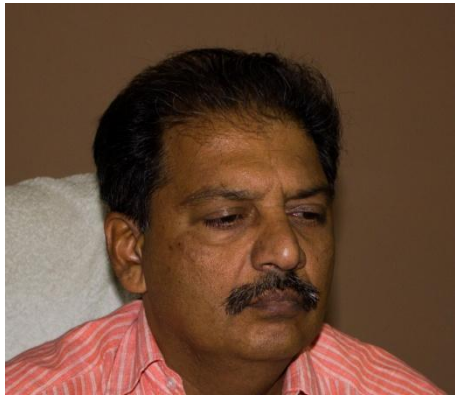


The remaining eight informants in this category were researchers within the social sciences or economics working on topics connected to agriculture and irrigation, and the farmers' situation in Andhra Pradesh. Professor emeritus D. Narasimha Reddy (left) is also a trustee of the EU-funded program Centre for World Solidarity. This organization is working for the community use of water resources.

Professor emeritus Gautam Pingle was from the Centre for Public Policy and Governance, Administrative Staff College of India. He has been writing on the subject of irrigation in Telangana in a historical perspective. Professor Galab was Director of the Centre for Economic and Social Studies (CESS). He has written about farmers' suicides together with one of the other informants, associate professor E. Revathi (CESS). Professor Gopinath Reddy was also a researcher at CESS, and knew well about farmers' distress in Andhra Pradesh.

Dr. V. Ratna Reddy was the Director of the Livelihoods and Natural Resources Management Institute, and has been writing extensively about groundwater and electricity subsidies.

Dr. Dinesh Kumar was Director of the Institute for Resource Analysis and Policy. He and has published widely on groundwater management, and has comparative knowledge of responses to electricity pricing in water and electricity use in Indian states such as Gujarat, Uttar Pradesh and Bihar.



V. Ratna Reddy



Gopinath Reddy



Dinesh Kumar

Dr. Radkhika Cherukuri was program director and researcher at the Centre for Agrarian Studies at National Institute of Rural Development (NIRD), a government body located in Hyderabad. She had good knowledge of the government programs in the state, and the situation among farmers connected to their access to water. Dr. Cherukuri gave written answers to the interview by e-mail.

The third group of informants was government officials, from the irrigation and electricity sectors respectively. It was important to include the perspective of the government officials in the fields most relevant to the topic. The first of these two informants was an official from the Central electricity distribution company, which is commonly referred to as Discom and located in Hyderabad. The company was one among four regionally located electricity Discoms in Andhra Pradesh, and is distributing electricity to Hyderabad and the surrounding areas, including Mahabubnagar district. This official preferred not to have the name printed and published. The second of these informants was Mr. G. Ratna Kumar, who is Managing Director and Vice Chairman of Andhra Pradesh State Irrigation Development Corporation (APSIDC).

The fourth category of informants was the professionals working for the non-governmental organizations in Andhra Pradesh. Included in this category are Mr. A. Ravindra, Mr. Rama Mohan, Mr. Anjal Prakash and Mr. Rahul Sen. All four of them have been working on irrigation and bore-wells in the field.

Mr. A. Ravindra works for the Watershed Support Services and Activities Network (WASSAN), which has a program for sharing bore-wells. Mr. Rama Mohan was team leader of the Sustainable Ground Water Management (SuGWM) Project. The SuGWM Project was initiated and sponsored by the Centre for World Solidarity (CWS). Like WASSAN, the project has experiences with bore-well sharing. Mr. Mohan had technical field experience.

Dr. Anjal Prakash was the executive director of South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERS). He answered questions related to water from a poverty and gender equity angle. Mr. Rahul Sen has been working on conjunctive use of water from canals and bore-wells. He was the Director of R S Development Solutions and Research Services. Mr. Sen had knowledge of both the technical and political aspects of groundwater use.

The interview situation

The first focus group meeting was conducted in Aurepalle on March 8 2013. 15 men of Aurepalle village were present at the meeting, and some of them were farmers. Most of these focus group members were village elders; two of them were from the Congress Party. The former village sarpanch (president), E. Lakshma Reddy who supported the Congress party was present at the meeting. The interview was conducted around midday and part of the village immersion.



Focus group meeting Aurepalle, March 8 2013. Translator to the right, Jin Kathrine Fosli, Mr. G D Nageswara Rao, Dr. Amarender Reddy in center and focus group members. Photo: Kumar, driver, ICRISAT.

The questions were read from a sheet in Telugu by Dr. A. Amerender Reddy, who was from the Nalgonda district and hence a native speaker of Telugu. A translator provided through ICRISAT explained the answers to me, and helped me ask additional follow-up questions. The meeting was backed up by an audio recording, like most of the interviews were.

On the same day I and Dr. A. Amarender Reddy met Mr. Venkateswar Rao of the Cooperative Society in Aurepalle. He gave us key background information about the electricity connection fee and the Andhra Pradesh Water Land and Trees Act (APWALTA) of 2002, which regulates the distance between the bore-wells. The interview was conducted in Telugu by Dr. A. Amarender Reddy, from the sheet of standard questions.

The two last focus group meetings were conducted in Aurepalle before and after mid-day on April 2 2013. I was accompanied by Dr. Amarender Reddy on this trip, and he also interpreted between Telugu and English.

The first of these two focus group meetings, conducted around 10 AM upon our arrival, was a good occasion for asking follow-up questions to the last meeting. The focus group members explained about changes in cropping patterns in the village since the electric bore-wells had become a common feature. They also helped me make a reconstruction of the historical electricity charges in the village since the electricity arrived in 1962. The focus group members gave information about water availability in the village tank, and increasing numbers of bore-well failures. The members of Aurepalle present at the meeting were: Mr. E. Lakshma Reddy, Mr. V. Veerath Gowd, Mr. E. Ayyappa Reddy, Mr. A. Ranga Rao, Mr. Ragn Kishore Reddy, Mr. B. Navayya Gowd, Mr. B. Krishnah Gowd, Mr. E. Sova Reddy, Mr. B. Yadayya, Mr. B. Pavtw, Mr. G. Narsimka Gowd, Mr. E. Taipd Reddy, Mr. V. Vera Rao and Mr. K. Madhava Chori.



The focus group members of the second meeting conducted on April 2 were nearly all members of the local women's Self Help Groups (SHGs). The groups have mostly been active since approximately the year 2000 in Aurepalle. The

SHGs were given funds for purchase of agricultural inputs, livestock and machines under the watershed program. Although the groups had little to do with irrigation directly, the members are familiar with the situation in Aurepalle and also know how different social groups may have benefitted or lost from the policy. The members of Aurepalle present at this meeting were Ms. P. Yadamma, Ms. Satyanna, Ms. W. Malkaya, Ms. K. Sumachi, Ms. Alivelw, Ms. Venamma, Ms. Laxmayya, Ms. B. Anjamma, Ms. K. Jayamma, Ms. Lachanna, Ms. Layamma, Ms. Radma, Ms. Sivakumavi, Ms. Nitin, Ms. Makesh, Ms. Chinma Rao, Ms. Venkelerh and Ms. Siva.

For practical reasons I sent the question form to the three other villages in the state through Mr. Amidala Siddappa at ICRISAT, who forwarded the question forms to the field investigators in Dokur, JC Agraharam and Pamidipadu. They consulted people in the villages, and I received written answers in English. The remaining respondents also gave their answers in English.

The selection of interview sources

Nearly all of the interview informants had first-hand knowledge of how the policy affected the rural, and indirectly also the urban, population of Andhra Pradesh. The variation of the informants' backgrounds was a qualitative strength, enabling me record opinions from a variety of angles. There are advantages and challenges of having a large number of oral sources, collected through live interviews. The interviews were all conducted during a short period of time, and the interview sources therefore had a similar starting point although representing different institutions.

I was able to ask the informants the same questions, varying somewhat depending on their professional background and field of knowledge. It proved a good way of limiting the topic of the thesis. After conducting 25 interviews based on the same questions, and reading through them, it was easier for me to decide on one topic. Being able to steer the material in the direction of facts and developments of historical importance to the subject was a strong advantage for me. How the groundwater availability may have changed during the years of the policy is one example of where I put the emphasis. Changes of cropping patterns in Aurepalle and the three other villages as a consequence of changing water availability followed quite naturally as a question.

One particular event I wanted to have more information about was the death of Chief Minister Y. S. Rajasekhara Reddy in a helicopter crash in 2009. I asked several of the informants if they had experienced a policy change after this. To my recollection all of the informants who were asked replied that they had in fact experienced a worsening supply of electricity and water after the death of Y. S. Rajasekhara Reddy. But the informants differed widely in their perceptions of the main causes for this worsening of the situation – from Rahul Sen and Dinesh Kumar emphasizing the current state finances to the Field Inspector of Pamidipadu describing how the leadership of the late Dr. Reddy coincided with good rainfall in the state while the policy had a nominal effect after the change of leadership in the state Congress Party after 2009.

A strong advantage in being able to select the interview sources myself in co-operation with Amarendra Reddy of ICRISAT and at the advice of professor emerita Pamela Price, Rajagopal and Staffan Lindberg, was that I was able to conduct a large number of interviews on village level in focus group meetings, and through the field investigators sending written answers. Although I have seen that farmers have been consulted in some of the research literature, such as *The Political Economy of Agricultural Policy Reform in India: Fertilizers and Electricity for Irrigation* written by Birner, Gupta and Sharma (2011), I find it valuable having the perspective towards how the policy is interpreted by, and has affected, the target group of it. I was able to ask the respondents to explain in details, and to ask follow-up questions. This is one advantage of live interview sources compared to written answers sent by e-mail, or research literature.

About the interview method

The interview method has some challenges to it. A very obvious challenge is that I was in Hyderabad for only a short time, six weeks. Therefore, I started sending out requests for interviews and suggestions for sources already by the end of 2012. A challenge I had not given much thought was the travelling distances. It may seem obvious, yet a person who is used to being able to reach most interview sources within walking distance, conveniently located along the main street in Oslo, would be surprised by the distances. Planning also became a bit tricky, as a journey lasting three quarters in the morning could take three hours during rush hours. I was fortunately welcomed with warm enthusiasm for my subject, and all the informants I was in touch with took a keen interest in my research.

One particularly challenging issue about oral sources is that they may remember events quite differently from one day to another. The issues of relevance this topic are mainly limited to the 1960s and up to today, although the main period is even shorter and closer in time, from 2004 and up to 2013. Even if the main period of my research is close in time, the interview sources may have forgot or changed their memory of events in the past. This challenge is described by professor Knut Kjeldstadli in the publication *Fortida er ikke hva den en gang var* from 1999. One example of how to strengthen the accounts from oral sources is to conduct focus group meetings in plenum. The respondents may then be able to correct each other. Having a translator who is familiar with the situation is another way of countering this challenge. The interviews will be checked against each other, as a method of verifying, strengthening and supplementing the various accounts. The additional literature also constitutes an important supplement that I can make use of for comparisons.

The interaction between the interviewer and informants may affect the content of the information to the extent that it becomes a challenge, which is also described in Knut Kjeldstadli's publication. The informants may even misread the situation. The focus group members, knowing that the interviewer came through ICRISAT could think that they would increase the likelihood of keeping or gaining subsidies by overemphasizing the lack of rain or electricity for instance. In the first focus group meeting, on March 8, the focus group members said there had been low levels of rainfall, with one exception since 2004. When talking to Pamela Price later, she told me that there was good rainfall in the area in the period after 2004-05.

The farmers may, however, not have meant that the rainfall was poor compared to the drought in 2001-2004. What they might have meant was that the rainfall, with two or three exceptions, was too low to fill the local water tank in the period after 1980. This is what the male focus group members said the second time I met them, on April 2 2013.

Comparing the interview material to other sources

The interview sources could mainly give me their opinions, observations and impressions about the development of the groundwater situation in Mahabubnagar District and Prakasam District in specific, and Andhra Pradesh in general. To counter this challenge I made comparisons to statistical material and official sources, such as the groundwater information released in 2007 by the Central Ground Water Board under the Ministry of Water Resources, Government of India. The groundwater information for Mahabubnagar District is one of the most relevant sources, as Aurepalle village and Dokur are located in Mahabubnagar District. I compared this information with the groundwater information for Prakasam District, where JC Agraharam and Pamidipadu are located. The groundwater information includes data on cropping patterns, rainfall patterns, farmers' distress and suicides in the period right after the free electricity policy was introduced. The four ICRISAT-leaflets stating village details of the four test-villages provided complimentary information.

A good official source is the Twelfth Five Year Plan released by the national Planning Commission in 2011: *Faster, Sustainable and More inclusive Growth: An Approach to the Twelfth Five Year Plan*. A valuable statistical source is *Agricultural Statistics At a Glance 2012* and previous statistics released by the national Department of Agriculture and Cooperation under the Directorate of Economics and Statistics. The time series contain data of for instance state wise yields of important crops. This enabled me to compare the information I got from the focus group meetings and other informed observers with district and state level data. I kept relevant articles published in the newspapers *The Deccan Chronicle*, *The Hindu* and *The Times of India*. The newspapers are all available online.

Pamela Price has written extensively on the political context of free electricity and irrigation promises in Andhra Pradesh. The most useful publications on the subject included *Patronage and Autonomy in India's Deepening Democracy*, which will be published this spring by Cambridge University Press, in addition to «A Political Breakthrough for Irrigation Development: The Congress Assembly Campaign in Andhra Pradesh in 2003-2004», part of a 2011-publication at Anthem Press, and «Development, Drought and Campaign Rhetoric in

South India: Chandrababu Naidu and the Telegu Desam Party, 2003-2004», part of a Routledge-publication in 2010.

P. Sainath, correspondent in rural Andhra Pradesh for *The Hindu*, has followed the situation for farmers in the state for years. He frequently interviews farmers and the rural population, and is a good source for opinions and developments in villages of Andhra Pradesh. Sainath is also a good source on farmers' distress. Another source on farmers' suicides is «Suicide as Vulnerability: Some Dimensions of Agrarian Distress in Andhra Pradesh» published by E. Revathi at CESS in 2005.

Three other articles provided information on rural development and regional disparities in the state: «Regional disparities in Andhra Pradesh, India» was published by Amarender Reddy and MCS Bantilan in *Local Economy* in 2012. «Dynamics of the agricultural economy of Andhra Pradesh, India since the last five decades» was published by Amarender Reddy in *Journal of Development and Agricultural Economics* in 2011. «Irrigation in Telangana: The Rise and Fall of Tanks» was published by Gautam Pingle in *Economic & Political Weekly* in 2011.

Groundwater Governance: Development, Degradation and Management (A Study of Andhra Pradesh) was a CESS-monograph published by M. Srinivasa Reddy and V. Ratna Reddy in 2012. The monograph had very useful time data on groundwater development in Andhra Pradesh, and provided valuable insights on experiences of community management and groundwater management in Andhra Pradesh. *Groundwater Management in India* published by Dinesh Kumar in 2007 was another good source on groundwater on the same subject. The discussion paper *Failure of Agricultural Bore Wells in Hardrock Areas of Andhra Pradesh: A Diagnostic Analysis* published by Rama Mohan and Centre for World Solidarity in 2012 gave technical, empirical information on bore-well failures. «India's Ground Water Irrigation Economy: The Challenge of Balancing Livelihoods and Environment» written by Tushaar Shah in 2009 provided good insights into the dilemmas Indian authorities faced in groundwater management.

The World Bank has released a 2010-report: *Deep Wells and Prudence: Towards Pragmatic Action for Addressing Groundwater Overexploitation in India*. This report gave useful information from an international perspective.

The United Nations has also published a wide range of works related to environmental challenges and water security. Their publications range from online facts to the comprehensive Intergovernmental Panel on Climate Change (IPCC), which was a series of publications, some of them still forthcoming at the time of writing. I have used *Fifth Assessment Report: Climate Change 2013 (AR5)*, part II in the conclusion.

Additional information was found in a wide range of discussion papers, articles appearing in *Frontline* and *Economic and Political Weekly*, *Indian Journal of agricultural economics*, other articles and research literature, official websites in India and Norway, and law texts online.

Limitations

The objectives of the study and the nature of the research have certain limitations: As a history student, I had to limit myself to what was possible to say within the framework of a master's thesis of history. In my research I discuss what it is possible to establish from the information which is available. I will relate the accounts from the test-villages in to official groundwater information. Based on these sources I will make comparisons with the opinions and accounts of other informed observers, the research literature and technical data.

The research field is extremely complex, and it may sometimes be impossible to single out the main cause of a certain trend. One example of this is a rising number of electric borewells in the state, which was a trend already before the policy was introduced in 2004. What I could discuss was to which extent the policy may have contributed to the already existing development. One methodological difficulty in assessing for instance economic growth or decline due to the policy of free electricity is the variations in the rains. The demand for electricity was generally lower during years of good rainfall, and one might expect fewer failures of water-intensive crops. The years of Y.S. Rajasekhara Reddy's period happened to be years of good rainfall. Therefore, it is difficult to decide whether economic and agricultural growth during his period was because of the rain, of the policy, or a combination of both.

3 2004-2009: Initial effects of free electricity

In this chapter I will discuss the initial impacts of the free electricity policy, making comparisons between the local level and state level. I will be using the four ICRISAT test-villages as examples. They reported changes during the first years of the policy following 2004, such as an increased number of small and marginal farmers trying to enter into bore-well farming.

Starting by discussing the access to bore-wells for small, medium and large farmers, I will argue that the policy of free electricity *intensified* an already existing trend of increased bore-well diggings. However, the medium scale and large scale farmers had a disproportional capacity to benefit from the subsidy, and to sustain the financial risks connected with extracting the water.

Access to water was the crucial aspect for the farmers. Access to electricity was connected to the supply of irrigation water, but only a secondary consideration: Electricity was important for the farmers as a means to accessing the irrigation water from the bore-wells. Around one half of all cultivable land in Andhra Pradesh is in semi-arid zones.⁴⁷ People's livelihood was to a large extent in the farming sector in these areas of the state. As long as farming populations had access to water facilities, they had opportunities and hope, but in the opposite cases they lost their livelihoods.⁴⁸

According to a common classification, semi-arid zones generally have erratic rainfall of up to 700-750 millimeters a year.⁴⁹ Water scarcity was increasing in semi-arid and arid regions on a global basis, threatening the stability of up to 700 million people who could be displaced as a result of climate change.⁵⁰ 22.6 million square meters constituting 15.2 percent of the world area is semi-arid zones.⁵¹ Their populations were challenged by recurrent droughts, erratic rainfall and low-fertility soils.⁵² Poverty was widespread, but the farming

⁴⁷ Revathi in an interview, 2013.

⁴⁸ Field investigator in Dokur, 2013. Focus group meeting with SHGs in Aurepalle on April 2 2013.

⁴⁹ Definitions vary somewhat. A common definition said areas with between 275 and 750 millimeters of annual rainfall. The Land Degradation Assessment in Drylands (LADA) classification, one of the most recent definitions, stated between 200 and 500 millimeters of annual rainfall in semi-arid zones.

⁵⁰ United Nations Department of Economic and Social Affairs (UNDESA). *UN-Water factsheet on water security*, available at: <http://www.un.org/waterforlifedecade/scarcity.shtml>

⁵¹ United Nations Decade for Deserts and the Fight against Desertification, *Why now?* Available at: http://www.un.org/en/events/desertification_decade/whynow.shtml

⁵² Mohamed Salih and Ahmed 1993.

populations could counter challenges they met by using new technology. They largely depended on subsistence farming for their livelihoods. As we will see, resource degradation and unsustainable farming in the wake of new technology posed new challenges for policy-makers and people doing farming.

Two of the three major regions of Andhra Pradesh, Telangana and Rayalaseema, are drought prone semi-arid zones where poverty is high compared with the coastal Andhra region. Researchers estimated that 12.1 percent of the population in Telangana, and 16.5 percent in Rayalaseema were poor in 2004-05.⁵³ The estimates were based on average unweighted poverty ratios, and monthly expenditure per person for the year 2004-05, from the 61st Round of National Sample Survey Office (NSSO) in India. The percentage of poor was only 7.6 in the coastal Andhra region, where rainfall is higher than in Telangana and Rayalaseema.⁵⁴

The districts of the coastal Andhra region generally had better access to water than the semi-arid regions.⁵⁵ Andhra Pradesh accordingly had regional disparities in water, agricultural growth and the value of agricultural production.⁵⁶ The two other regions lagged behind the coastal Andhra region's value of agricultural production since the state was formed in 1956.⁵⁷ Telangana started catching up from the 1990s, but Rayalaseema's agricultural growth remained stagnant.

The agricultural growth in Andhra Pradesh during the period after 2004 and until 2010-11 was remarkable, with an increased contribution to the gross state domestic product (GSDP) from the agricultural sector.⁵⁸ The agricultural growth could be taken as a sign of government success in extending irrigation in the state through the free electricity policy. I will, however, argue that the semi-arid regions continued lagging behind the output of the canal-dominated coastal Andhra region. The latter was the largest contributor to the increased GSDP among the states of Andhra Pradesh.

After having conducted around 25 interviews with informed observers of the free electricity policy in Andhra Pradesh, I was struck by the similarity to the situation described in professor emeritus Staffan Lindberg's article «When the Wells Ran Dry: The Tragedy of

⁵³ Amarender Reddy 2011: 394. Chaudhuri and Gupta made the estimates based on 61st round of National Sample Survey Office in India.

⁵⁴ Amarender Reddy 2011: 394.

⁵⁵ Cf. Srinivasa Reddy and Ratna Reddy 2012: 29.

⁵⁶ Galab in an interview, 2013.

⁵⁷ Amarender Reddy 2011: 396.

⁵⁸ Andhra Pradesh Government, see <http://www.ap.gov.in/Other%20Docs/STATE%20ECONOMY.pdf>.

Collective Action among Farmers in South India».⁵⁹ The author described how the farmers' movement emerged as a political force in Tamil Nadu between the spring of 1970 and 1975.⁶⁰ Their mobilization was a response to challenges farmers encountered in bore-well agriculture.⁶¹ The challenges were the same as in semi-arid zones of Andhra Pradesh: Droughts, water scarcity and high input costs for farmers who relied on electricity for bore-wells, compared to farmers in canal-irrigated areas. With competitive populism between the two major parties DMK and AIADMK of Tamil Nadu, politicians outbid each other in their eagerness to aid farmers in their scramble for water.⁶² By gaining free electricity the farmers' movement in Tamil Nadu took a long step down the road towards over-exploitation of water and electricity. The farmers served their individual interests through cheap pumping of a limited common property resource. Thereby, they contributed to an ecological crisis of sinking groundwater-levels and decreasing surface water.

In order to obtain free electricity the farmers' movement argued that farmers in the canal-irrigated areas of Tamil Nadu got their water practically for free, facilitated by the state government. Therefore the farmers relying on pump-wells needed free electricity, in their opinion.⁶³ The same argument of regional equality was generally repeated in the interviews I conducted. Lindberg wrote his article in 1999 after ten years of free electricity in Tamil Nadu. Similarly, I am writing this work ten years after the implementation of the policy in Andhra Pradesh in 2004.

The distribution of welfare goods, such as free electricity for farmers, was characteristic of the paternalist populism dominating Tamil Nadu since the 1970s and neighboring Andhra Pradesh since at least 1983.⁶⁴ Another central aspect was the lack of long-term planning, appealing more to the immediate needs of the masses. Government spending which made quick political returns possible was characteristic of what can be labeled *populist clientilism*.⁶⁵ Here, *populist clientilism* contrasted with *bureaucratic clientilism*, as the latter was traditionally directed at long-term projects such as nation-building.

⁵⁹ Staffan Lindberg 1999.

⁶⁰ Ibid., p. 270-272.

⁶¹ Ibid., p. 279.

⁶² Ibid., p. 288. Reference to Madras Institute of Development Studies 1988: 333-34.

⁶³ Cf. Lindberg 1999: 267, 279. The author states that competitive populism has been characterizing politics in the state since the Tamil nationalist politicians came to power in 1967.

⁶⁴ Subramanian 1999: 246, 293. In Andhra Pradesh, political populism was a dominant feature at least since the emergence of the Telugu Desam Party, which was founded by N. T. Rama Rao in 1982-83.

⁶⁵ Subramanian 1999: 69.

The concept *patronage democracy* may be useful for the reader's understanding of the electoral situation in 2004. Rather than focusing on the formal policies of parties, voters in a patronage democracy emphasized the personal characteristics of politicians to a much larger extent.⁶⁶ The common practice that politicians and lawmakers had widespread access to distribute state resources and services among their voters was the central feature of patronage democracy.⁶⁷

In 1999 Lindberg expressed his concern regarding the ecological consequences of the virtual mining of groundwater. He warned of an over-extraction because of the farmers' individual use of this scarce common property resource through electrical pump-sets. After ten years of free electricity the diminishing water resources resulting from over-extraction were already a problem in dry areas of Tamil Nadu.⁶⁸ Lindberg saw the danger of over-exploitation of natural resources as inherent in the increasingly powerful technology used in agriculture. He held that the alternative was to bring the use of such tools under political control. When the policy of free electricity for agriculture was implemented in Andhra Pradesh in 2004, the results of similar policies in other states were known by researchers.

Initial effects of the policy

Aurepalle village, Mahabubnagar District, had soils scientifically termed shallow to medium alfisol, typical of the Telangana region and semi-arid zones in general.⁶⁹ The red soils that covered over 66 percent of cultivated area in Andhra Pradesh were of low fertility.⁷⁰ Risks and constraints related to these soils and the environment of the semi arid tropics kept farmers reluctant to invest substantially in agriculture.⁷¹ Annual rainfall was scarce and erratic throughout Telangana, at 700 millimeter.⁷²

Because of the limited amount of water available for cultivation, Aurepalle farmers traditionally opted for dry crops of low water intensity: Castor, pearl millet and sorghum. Mahabubnagar farmers who resided in canal areas, or had access to tanks or wells, were able to grow paddy. Pulses were among the principal rain-fed crops in the district, while farmers who gained access to irrigation could start growing commercial crops such as chili, groundnut and

⁶⁶ As argued by Baruah 2010, and Kitschelt and Wilkinson 2007. See Price, with Srinivas, forthcoming: 2.

⁶⁷ Chandra 2004, see Price, with Srinivas, forthcoming 2014: 2.

⁶⁸ Lindberg 1999: 290.

⁶⁹ Reddy, Ramana; Mohan Rao, Kiresur and Bantilan 2011: 1.

⁷⁰ See for instance Central Ground Water Board 2007a: 1.

⁷¹ Wani et. al 2009. Cited in Pathak, Sudi, Wani and Sahrawat 2013: 3.

⁷² Reddy, Ramana; Mohan Rao, Kiresur and Bantilan 2011: 1.

cotton.⁷³ Open wells and later bore-wells were available to some Telangana farmers from at least the 1960s, but the large scale farmers most likely had better access to these water sources than smaller farmers.⁷⁴

During my first visit to Aurepalle the focus group members reported having experienced a major change in the access to bore-wells since the 1980s and 1990s, when only upper caste farmers had access to bore-wells.⁷⁵ After 2000 the focus group members thought there was an almost fourfold increase in the cultivation of water intensive paddy, because of the increased number of bore-wells. Farmers who were small-scale and medium-scale gained access to their own bore-wells during the same period. Some focus group members thought the potential opening for newcomers in bore-well agriculture was an initial benefit resulting from free electricity. General experiences of pumping groundwater in India, however, indicated that long-term costs outweighed initial benefits. The negative consequences of over-extraction affected the poor disproportionately.⁷⁶ One of the focus group members in 2013 said that maize and cotton were emerging as alternative crops, because there had been drought for more than a year.⁷⁷ These were crops of low water intensity, which indicates that the growth in the cultivation of water intensive paddy did not last.

Similar to the focus group members in Aurepalle, the field investigator in Dokur (also in Mahabubnagar District) reported initial changes after the policy of free electricity became implemented in 2004: Farmers in this village, including some of the more financially vulnerable people, invested more money on bore-wells.⁷⁸ The irrigation sources in Dokur dried up during the last 30 to 40 years because of recurrent droughts. Consequently, a substantial part of Dokur's population shifted out from agriculture.⁷⁹ Pressure on natural resources such as water was impending in Mahbubnagar district, where population density reached 190 persons per square kilometer.⁸⁰ To give a perspective, the Norwegian agricultural county Hedmark had a population density of 7 persons per square kilometer.⁸¹

⁷³ Central Ground Water Board 2007a: 5.

⁷⁴ Since they had more access to land and investments in general. For a list of water sources historically in Andhra Pradesh, see Srinivasa Reddy and Ratna Reddy 2012: 29.

⁷⁵ Focus group meeting, Aurepalle, March 8 2013.

⁷⁶ Cf. World Bank 2010: 19.

⁷⁷ Focus group meeting, Aurepalle, April 2 2013.

⁷⁸ Field investigator in Dokur, 2013.

⁷⁹ Krishna, Mohan Rao, Nageswara Rao, Kiresur and Bantilan 2011: 1.

⁸⁰ Central Ground Water Board 2007a: 1.

⁸¹ Hedmark Fylkeskommune 2013.

The field investigator in a different corner of the state, JC Agraharam (Prakasam District), reported initial effects such as increased cultivation of cash crops, and lowered costs of input during Y.S.R. Reddy's five years of rule.⁸² The quite low average annual rainfall of 542, 4 millimeter in Prakasam District was a result of years of rainfall failures after 2001.⁸³ In the first years of the free electricity, however, improved rainfall added to its effect, allowing farmers to successfully cultivate their fields.⁸⁴ When free electricity was granted, only the forward castes, who dominated the village, cultivated land in JC Agraharam. The open wells and bore-wells belonged to them, as only the upper caste farmers had the financial capacities to do agriculture.

More and more farmers started growing cash crops after 2004, and as a result of their market entry they could expand their diets. The people in JC Agraharam started to grow and eat paddy, and could eat vegetables and meat in addition to millets. Examples of commercial crops under cultivation were cotton, chili, maize, sunflower and chickpea.⁸⁵ Farmers continued growing dry crops such as peas, pearl millet and groundnut in addition to commercial crops on the poor saline soils. The soils turned saline because of fertilizers. In this slowly developing village, remittances from children doing paid jobs in the army allowed some of the BCs to invest more in agriculture.

In the nearby village Pamidipadu (of Prakasam District), the people were happy when the government in Andhra Pradesh implemented free electricity. The farmers thought they could be growing commercial crops successfully, and maximize production. They dreamt how they could finally be developing economically and socially.⁸⁶ In this village, the medium fertile shallow to deep black soils of low moisture storage covered most of the cultivable land. The rest of the village soils were red sandy soils and saline soils that had low fertility.⁸⁷ Pamidipadu farmers were able to cultivate during both the rainy Kharif season of autumn and the Rabi season of winter and spring, and could do double cropping when there was enough rain.⁸⁸ Most farmers in Prakasam district, however, depended on a single rain-fed crop.⁸⁹

⁸² Field investigator in JC Agraharam, 2013.

⁸³ Central Ground Water Board 2007b: i.

⁸⁴ Field investigator in JC Agraharam, 2013.

⁸⁵ Ramesh, Mohan Rao, Kiresur and Bantilan 2012: 3.

⁸⁶ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

⁸⁷ Sidappa, Mohan Rao, Kiresur and Bantilan 2012: 2.

⁸⁸ *Ibid.*, p. 3. Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

⁸⁹ Central Ground Water Board 2007b: 1.

After the implementation of free electricity, some Pamidipadu farmers were encouraged to dig bore-wells and increase their investments in agriculture through bank loans.⁹⁰ Rainfall improved from previous years after 2004, and with the increased access to water and new expensive bore-wells, tractors and threshers, they shifted towards commercial crops. As we can see from the table of cropping patterns in Pamidipadu chili, tobacco, chickpea and cotton became the major commercial crops in that village. Farmers continued cultivating fodder crops such as jute during the Kharif season after 2004, but stopped growing food crops like maize.

Table 2: Cropping pattern in Pamidipadu 2002-2013⁹¹

Pamidipadu	Kharif Season	Acreage										
		2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Crop												
Maize	186	505	15	20	0	0	0	0	-	-	-	
Pigeon pea	113	202	15	0	0	54	500	400	278	45	75	
Black gram	0	0	0	40	67	203	0	102	-	224	0	
Green gram	0	1	0	20	0	0	0	0	102	-	-	
Vegetables	39	177	0	86	0	0	0	0	50			
Chili	180	185	464	106	195	151	0	146	196	-	75	
Cotton	0	105	0	143	0	0	0	0			160	
Jute	0	0	0	0	0	0	56	96			42	
Sesumam	0	0	1786	0	106	0	0	0			0	

Pamidipadu	Rabi season Acres										
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Crop											
Maize	9										
Pigeon pea				133							
Chick pea	3333	3005	2347	3742	3159	3415	1500	1800	4050	3700	4200
Green gram	12	90	10	30		26	37		104	62	72
Black gram	625	108	124	77	133	310	321	425		107	75
Chili	200	664	84	10	69	250	237	200	105	262	150
Vegetables	25	10				46	37				
Tobacco	300	247	326	316	294	286	280	300			200s

Rainfall and crop failures contributed to farmers' distress in Prakasam District.⁹² In Pamidipadu, the watershed management program was implemented in continuous years of drought. Check-dams were constructed through this program between 2001 and 2003, and

⁹⁰ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

⁹¹ Table made and compiled by Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

⁹² Central Ground Water Board 2007b: 1.

from 2010 to 2011.⁹³ Farmers could use that water whenever it was available. The large number of water sources farmers in the village had access to could trick the reader into thinking that water was readily available to them. Bore-wells were, however, the only water source in the village, since the four village tanks were silted and only kept for recharging the groundwater. Farmers could access canal water from villages 5 to 15 kilometers off by using lift technology.⁹⁴ This option of life-saving irrigation for crops was reserved for drought periods.

To give a precise definition of the groups that were able to benefit directly from the free electricity policy, I will use the following definition of who may have benefitted: A person with access to, and primarily ownership to, land and the capacity to raise enough money for a bore-well. A group of individuals investing in one or several shared bore-well(s) could also have been able to benefit directly from the policy. A person without access to land was not in the position to benefit directly from this policy.⁹⁵

In the focus group meeting in Aurepalle some people said that nearly all groups of farmers in the village benefitted from free electricity.⁹⁶ By farmer the focus group members referred to landholders of above 1 hectare. Their statement masks the fact that the majority of the population of 4764 persons was not in a position to benefit from the free electricity.⁹⁷ The majority consisted of marginal farmers (1464) and landless persons (2153), who were virtually excluded from access to the free electricity for agriculture.⁹⁸ The social groups in the village who did gain access to their own bore-wells as a result of the free electricity policy were mostly small-scale farmers owning 1-2 hectares of land, and medium-scale farmers owning 2-4 hectares of land, in addition to large-scale farmers holding above 4 hectares.⁹⁹

The access to bore-wells

The respondents in the four villages stated that an increased number of small and marginal farmers tried entering into bore-well farming. There was not, however, sufficient evidence to say that improvements caused by the free electricity policy were comprehensive enough to call it a change of social structure or living conditions.

⁹³ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

⁹⁴ Sidappa, Mohan Rao, Kiresur and Bantilan 2012: 3.

⁹⁵ For instance Yella Reddy, who is the director of the Water and Land Management Training and Research Institute in Hyderabad, explained in an interview in 2013 that anybody having land will have access to water.

⁹⁶ Focus group meeting, Aurepalle, March 8 2013.

⁹⁷ Population numbers from Reddy, Ramana; Mohan Rao, Kiresur and Bantilan 2011: 5.

⁹⁸ Ibid.

⁹⁹ Ibid. Put together these three groupings constituted 1147 persons, a clear minority of the population. Additional information from focus group meeting, Aurepalle, March 8 2013.

More than 80 percent of the farmers in Andhra Pradesh are small and marginal farmers.¹⁰⁰ Due to their limited landholdings their access to irrigation remained skewed, and the comparatively larger farmers had a disproportional capacity to benefit from the free electricity subsidy.

The fundamental risk-taking capacities of the small and marginal farmers were not altered. Furthermore, the risks involved in bore-well diggings became higher in the areas where the bore-well density increased. Since their risk taking capacities were generally lower, there was a pattern of poor farmers being squeezed out from groundwater irrigation in rain-fed areas.¹⁰¹ With increased pressure on this limited resource, fierce competition often emerged among farmers. The poorest farmers were the least likely to sustain the high costs of drilling deeper or buying stronger pumps. As a result, they lost out. That pattern did not change substantially with the policy, and distress conditions continued in agriculture in non-command areas and in the state at large.¹⁰²

Aurepalle, Dokur and JC Agraharam reported how increasing numbers of medium-scale farmers, and also some small-scale farmers, tried drilling bore-wells as a result of the free electricity policy.¹⁰³ One such example was small-scale farmers among the BCs.¹⁰⁴ Small and marginal farmers, and their wives, could gain a small surplus through employment in the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). The center-initiated program, also known as the 100 days employment guarantee program, was launched in 2005 to increase livelihood opportunities in rural areas.¹⁰⁵ Workers were employed under such programs to clear bushes, do earth leveling and construct check dams and other work against payment.¹⁰⁶

¹⁰⁰ Directorate of Economics and Statistics, Government of Andhra Pradesh. Cf. Galab, Revathi and Prudhvikar Reddy 2013: 53.

¹⁰¹ World Bank 2010: 5.

¹⁰² Central Ground Water Board 2007a: 1. See also «Distressed Andhra Pradesh farmers selling organs to escape debt trap», *The Times of India*, March 7 2013.

¹⁰³ Focus group meeting, Aurepalle, March 8 2013; field investigator in Dokur 2013; field investigator in JC Agraharam 2013.

¹⁰⁴ Field investigator in Dokur, 2013; field investigator in JC Agraharam, 2013. The terms Other Backward Classes (OBC) or Backward Classes have been used interchangeably to distinguish these lower and intermediate caste members from the SCs. I will use the abbreviation BC. The categories of SCs and BCs were subject to affirmative action. I will use the term Forward Caste (FC) of the generally upper caste groups. Cf. Jaffrelot 2003: 214. For the legal definitions, see Government of Andhra Pradesh, *Commissions of Inquiry Act 1952*: iii.

¹⁰⁵ «The National Rural Employment Guarantee Act, 2005», Ministry of Law and Justice, New Delhi.

¹⁰⁶ Focus group meeting, Aurepalle, April 2 2013.

This additional source of income was one factor which may have contributed to an increased entry of small and marginal farmers into bore-well farming: The free electricity policy was an incentive for them to invest their surplus money in bore-well farming.¹⁰⁷ In addition, other government policies were implemented to secure better access to water for the SCs in particular. For instance, the government installed bore-wells on some SC farmers' land.¹⁰⁸ Perhaps as a result of these targeted policies the number of bore-wells for SCs increased in Aurepalle, from 0 bore-wells in 2001 to 10 bore-wells in 2011.¹⁰⁹

New groups of farmers could access the new technology and irrigation water through government initiatives such as the free electricity policy, as stated above. The larger scale farmers nevertheless had a disproportional capacity to benefit from the free electricity subsidy because of their generally higher access to land and financial resources. The small and marginal farmers constituted a clear majority of farmers in Andhra Pradesh. Their overall access to irrigation remained relatively modest if compared to the average number of bore-wells available to medium- and large-scale farmers.¹¹⁰

The following table shows that the number of bore-wells generally increased in Dokur after 2003, one year before the free electricity policy was implemented. The ownership remained unevenly distributed despite the increased number of bore-wells. Even with 97 available among the BCs, whom we can assume constituted a large share of the small and marginal farmers, there was still only one bore-well available per every 22 persons.¹¹¹ Similarly to Aurepalle, the SCs in this village were generally landless and did not benefit directly from the free electricity. At the other end of the scale, the large and medium farmers on average got access to two bore-wells per person.¹¹²

¹⁰⁷ Cherukuri in an interview, 2013.

¹⁰⁸ Revathi in an interview, 2013. For instance, the government installed 12 bore-wells for SCs in JC Agraharam in 2013 according to the field investigator in that village. The term Scheduled Castes (SC) was used since «the 1935 Government of India Act» designated the groups formerly known as untouchables. See Jaffrelot 2003: 214.

¹⁰⁹ Focus group meeting with SHGs, Aurepalle, April 2 2013.

¹¹⁰ It was estimated that less than 10 percent of small and marginal farmers in the state owned wells and pump-sets in 2007. See Kumar, Reddy, Nayanamoorthy and Sivamohan 2013: 77.

¹¹¹ On average. Population numbers from Krishna, Mohan Rao, Nageswara Rao, Kiresur and Bantilan 2011: 5.

¹¹² Ibid. Assuming the medium- and large-scale farmers were FCs.

Table 3: Access to bore-wells by caste in Dokur¹¹³

Category	2003		2008		2012-13	
	Bore wells	Open wells	Bore wells	Open wells	Bore wells	Open wells
FC	60	60	150	60	200	30
BC	10	20	50	20	97	10
SC	3	2	4	4	4	0
ST	0	0	0	0	0	0
Total	73	82	204	84	301	40

Looking at the bare numbers of the table, one could get the impression of an explosion of new bore-wells among the low status BCs and middling and upper status FCs in the village. But only 120 were in fact successful of the 200 bore-wells dug by the farmers of Dokur in total from 2004 to 2012.¹¹⁴ Even that success was limited: If there was rain the bore-wells recharged, but otherwise dried up. Aurepalle had an even more negative experience in 2012, when 200 new drillings resulted in 170 failures.¹¹⁵

The numbers are clear in the two cases above, yet groundwater is a field with so many factors that it is difficult for researchers and scientists to gain complete knowledge of the development.¹¹⁶ There were significant variations between the macro and micro level trends, in other words between the development in the state and at village level.¹¹⁷ There was no sufficient information of the exact reason of why 170 bore-wells failed in Aurepalle in 2012, but I will discuss the possible reasons in chapter 4. The table of bore-wells in Aurepalle and Dokur indicates that there were extensive bore-well diggings taking place already in the years before the policy.

One explanation for the high numbers of drillings, besides free electricity, may be that the farmers dug new bore-wells instead of deepening the existing bore-wells. Digging deeper would have been costlier, and fetching the water would have required a higher pumping capacity.¹¹⁸ A second explanation might have been that increased bore-well drillings in

¹¹³ Table made and compiled by the field investigator in Dokur, 2013.

¹¹⁴ Field investigator in Dokur, 2013.

¹¹⁵ Focus group meeting, Aurepalle, April 2 2013.

¹¹⁶ Narasimha Reddy in a plenum session at ICRISAT on April 3 2013.

¹¹⁷ The number of over-exploited villages has increased, even though the groundwater development in the state as a whole is not alarming. Srinivasa Reddy and Ratna Reddy 2012: 36.

¹¹⁸ Sen in an interview, 2013.

Andhra Pradesh generally came as a response to well-failure.¹¹⁹ Dry or low-yielding bore-wells continued pushing farmers into distress conditions in Mahbubnagar District after 2004-05.¹²⁰

Here, the marginal and small farmers from non-command areas stayed among the most exposed victims to agricultural distress. The distress conditions and high numbers of suicides continued at a fast pace in Mahbubnagar during the first years following the implementation of the free electricity policy.¹²¹ This was owed to a combination of increased bore-well dependency and failures, low crop yields, market fluctuations and losses leading to defaults of private debt.

Table 4: Bore-wells in Aurepalle and Dokur, Mahbubnagar District¹²²

Year	Aurepalle: No. Of bore wells	Dokur: No. of bore- wells
1980	4 to 5	4
1990	50	
2002	200	70
After new policy was implemented		
2005	250	
2008	300	200
2012	300	300

The table shows the approximate numbers of all bore-wells in Aurepalle and Dokur. There was seasonal functionality involved, which will be further discussed in chapter 4. Because of the free electricity, some farmers drilled more bore-wells, and among them some lost their investments due to bore-well failures.¹²³ Therefore, the policy of free electricity can

¹¹⁹ Kumar, Ratna Reddy, Narayanamoorthy, Sivamohan 2013: 77.

¹²⁰ Central Ground Water Board 2007a: 3.

¹²¹ Ibid., p. 1. Note that there were four years of deficit rainfall in this district between 2000 and 2005, and 2004-05 was the worst year.

¹²² Numbers for Aurepalle is based on information from the focus group meeting on April 2 2013. The field investigator in Dokur collected the numbers for that village.

¹²³ Field investigator in Dokur, 2013.

be said to have *intensified* an already existing trend of increased bore-well diggings.¹²⁴ To what extent farmers were motivated by the free electricity policy in undertaking new drillings is open to interpretation. There is considerable disagreement among scholars and other observers of the free electricity policy about whether or not it contributed to an increased number of bore-wells.

A. Ravindra of the NGO-network Watershed Support Services and Activities Network (WASSAN) and V. Ratna Reddy, director of the Livelihoods and Natural Resources Management Institute (LNRMI) in Hyderabad, have both been doing extensive work on groundwater management and policies. These two researchers argue that much bore-well digging already happened before the free electricity policy was implemented in 2004.

V. Ratna Reddy argues that much of the digging took place in the 1990s, while A. Ravindra has the opinion that there was an explosion in new bore-wells in the 1990s continuing into the early 2000s.¹²⁵ He maintains that much of the subsequent digging happened around 2005-2006, by which time the groundwater supply had become scarce or seasonal due to earlier diggings.¹²⁶ Neither of the two researchers said he could see any conclusive proof that the policy itself had contributed to an increase in the number of bore-wells.¹²⁷

The opposite was stated by farmers in Aurepalle and Dokur, who said that the free electricity policy contributed to an increased proliferation of bore-wells.¹²⁸ The argument that the policy of free electricity contributed to an increased number of bore-well diggings was supported by the researcher Gopinath Reddy at CESS. He is specialized in institutions and natural resource management, and held the opinion that there was a phenomenal growth in the number of bore-wells, amounting to what he labeled a rush.¹²⁹

Researcher and program director Radhika Cherukuri of Centre for Agrarian Studies at NIRD went one step further than him. She was of the opinion that the free electricity triggered a «mad rush» in going for bore-well extraction by the farmers, resulting in competitive digging.¹³⁰

¹²⁴ As suggested by for instance Narasimha Reddy in an interview 2013. He says bore-well use has increased in the state since the 1980s.

¹²⁵ Ravindra and Ratna Reddy in interviews, 2013.

¹²⁶ Ravindra in an interview 2013.

¹²⁷ Ravindra and Ratna Reddy in interviews, 2013.

¹²⁸ Focus group meeting, Aurepalle, March 8 2013; field investigator in Dokur, 2013.

¹²⁹ Gopinath Reddy in an interview 2013.

¹³⁰ Cherukuri in an interview, 2013.

How can we understand the differences of opinions expressed by respondents?

The extension of bore-wells in Andhra Pradesh occurred without strict monitoring from authorities, and some researchers referred to the public resource management as chaotic and anarchic.¹³¹ Bore-well irrigation remained an individual undertaking and the entire growth in groundwater irrigation came from private investment.¹³²

Some researchers considered the free electricity subsidy a small concession from the government to well-irrigation farmers.¹³³ One reason for this argument is that the private costs related to digging were far higher than the subsidy, and drilling was undertaken at the risk of failure and private investment losses.¹³⁴ Therefore, one respondent argued that the individual installation of bore-wells took place in the absence of other, and possibly better, government initiatives.¹³⁵ The farmers had knowledge about cultivation, but were no hydrologists. In many cases they dug using unscientific methods such as searching with a coconut or stick at their own risk, without consulting technical experts.¹³⁶

The individual nature of bore-well farming is at the core of the debate about groundwater extraction. Bore-well extraction was largely competitive, especially in the non-command areas where farmers generally had a limited degree of organization and co-operation. Researchers even labeled farming a gambling game of winners and losers.¹³⁷

Some among the lower castes may have benefitted from the free electricity policy through increased entries into bore-well farming.¹³⁸ Yet their capacity to take risks arguably remained lower than the FCs. The BCs, who were often small and marginal farmers, lacked the money and risk-taking capacities to compete in the water extraction with more well-off neighbors. Over time extraction became costlier for all farmers in villages having rising numbers of bore-wells. Only the richer farmers could however afford the investment in stronger pumps.

¹³¹ Kumar 2014. Shah 2008. Revathi in an interview, 2013.

¹³² Revathi 2005.

¹³³ See for instance Pingle 2011: 127. See also Srinivasa Reddy and Ratna Reddy 2012: 36.

¹³⁴ The subsidy is estimated to approximately Rs. 2, 200 per pump, but there were variations in the electricity supplies. See for instance Srinivasa Reddy and Ratna Reddy 2012: 36. At approximately Rs. 60 per feet the cost of a 200 feet bore-well can be estimated to Rs. 18, 000, including a service charge of Rs. 6, 000 for new electricity connections. Pump-set costs may imply that the cost was twice as high, around Rs. 30, 000 to 40, 000. The numbers were given by the field investigator in Dokur, Venkateswara Rao and Galab.

¹³⁵ Pingle 2011: 123.

¹³⁶ Focus group, Aurepalle, March 8 2013. The groundwater information for Mahabubnagar District confirms that unscientific drillings resulted in dry bore-wells. Central Ground Water Board 2007a: 3.

¹³⁷ Similar arguments by for instance Ratna Reddy, Revathi, Ravindra and Palanisami, 2013.

¹³⁸ This argument was stated by Ratna Reddy, and Rama Mohan of the organization Centre for World Solidarity shared this opinion. Mohan worked extensively in the field on bore-well failures in Andhra Pradesh.

Hence, the medium-scale and large-scale farmers, such as FCs, had a disproportional capacity to benefit from the free electricity subsidy. Their access to land and investment, and therefore resources such as groundwater, was higher than for the small and marginal farmers.¹³⁹ The SCs were generally landless, so the impact from the policy was most likely negligible for them.¹⁴⁰ They remained the first victims of drought.¹⁴¹ Some of the researchers argued that bore-well failures led to increased indebtedness among farmers, and some thought that higher debts was a factor contributing to increased suicide rates.¹⁴²

A. Ravindra used the term tragedy of the commons to describe the situation of the farmers depending on bore-wells in rain fed areas. Without any further facilitation or incentives to co-operate, the farmers competed over the limited natural resource of water.¹⁴³ In the original article «The Tragedy of The Commons», written by Garret Hardin in 1968, the author described exactly that kind of scenario, where individuals competed over limited common resources seeking to maximize their own advantages.¹⁴⁴ Doing so, they exhausted the resource.

The likely outcome in a scenario where two farmers competed in order to secure water for their plots would be that the farmer who could afford the additional investment in a stronger pump-set would «win». One or a few small-scale farmers in Aurepalle might have had a few good years, successfully cultivating a small plot helped by a new bore-well. Perhaps, as farmers often do, this farmer installed his bore-well next to a successful one.

For some time, both bore-wells might have worked with lower yields. In the end his somewhat richer neighbor, a large-scale farmer, might have invested in a stronger pump-set. Thus, the small scale farmer could easily have «lost the game» because the groundwater-levels declined with the competition, and he could not afford to drill deeper.

¹³⁹ Ravindra, in an interview, 2013.

¹⁴⁰ Argued by a SC woman during the focus group meeting with SHGs in Aurepalle on April 2 2013. The argument was repeated by Palanisami in an interview, 2013.

¹⁴¹ Ratna Reddy in an interview, 2013.

¹⁴² As held by Cherukuri and Gopinath Reddy in interviews 2013, but there are controversies related to the numbers and reasons for farmers' suicides.

¹⁴³ Ravindra in an interview, 2013.

¹⁴⁴ Hardin 1968: 4.

Too close spacing of bore-wells was prohibited by law in 2002, but the farmers were able to continue digging new bore-wells next to existing ones using their own finances, in violation of the regulation.¹⁴⁵ Also, because the electricity was of poor quality and quantity, it caused motor burns and repairs.¹⁴⁶

The richer farmers were one foot ahead in the competition for water. Yet as the risk of digging remained high and increased over the years, the state may have reached a saturation point in groundwater extension.¹⁴⁷ Water is a scarce resource, and the limit of groundwater extraction was reached in many places.¹⁴⁸ Installing new bore-wells in such cases resulted in lower yields and bore-well failures, causing a chain-effect of damaged crops and investment losses.¹⁴⁹ Because bore-wells were seen as the only source of productivity increase for farmers, who considered farming their only skill, they felt that there was no alternative but to dig for new wells despite failures.¹⁵⁰

Free electricity supplies after 2004

Electricity for agriculture became free in 2004, but the quantity and quality of the supply stayed poor. It is important to note that the individual electricity consumption for agriculture was unmetered.¹⁵¹ Therefore, researchers suspected that the amount of agricultural use was subject to manipulation in the estimation of unmetered electricity consumption. For instance, Sankar found in a study that the agricultural load was overstated by the electricity board.¹⁵² Commentators suspected that the overstatement could imply that what was reported as agricultural consumption actually benefitted other users, including industries or State Electricity Boards.¹⁵³

¹⁴⁵ Revathi in an interview 2013. According to the APWALTA Act of 2002 new bore-wells should not be installed within less than 200 meters from existing ones. Farmers must obtain permission from the Revenue Department according to this law.

¹⁴⁶ Galab, Revathi, Ravindra in interviews, 2013.

¹⁴⁷ Ratna Reddy in an interview, 2013.

¹⁴⁸ See for instance Srinivasa Reddy and Ratna Reddy 2012: 36.

¹⁴⁹ Mohan Rao, in an interview, 2013.

¹⁵⁰ Narasimha Reddy in an interview 2013. C.f. Sainath, «Sinking bore-wells, rising debt», *The Hindu*, June 23 2004.

¹⁵¹ The agricultural supply is measured through transformers, and statistically by random samples, according to an official of APCPDCL, 2013.

¹⁵² Dubash 2007: 47. The study was done in Andhra Pradesh by Sankar in 2003.

¹⁵³ For instance Sankar 2003; Gulati and Naryanan 2003. See Dubash 2007: 48.

There was disagreement between the village level informants and the Central Discom about how many hours of electricity was supplied. In 2004 the electricity was supplied for seven hours a day in Aurepalle, Pamidipadu and Dokur.¹⁵⁴ That is not to say that the supply was consistent at the start, one example being that Aurepalle received an uninterrupted supply for seven hours, while Dokur in the same district received seven hours divided into two to three shifts.¹⁵⁵ Therefore, it seems unlikely that the electricity supply was consistent throughout the state. Even if the electricity supply was not consistent, the three accounts above indicate that there was a comparatively good access to electricity during the first years of the free electricity policy, until around 2009.

Continued low agricultural growth in semi-arid zones

Andhra Pradesh had increased production and growth in agriculture from 2004 until 2010-11.¹⁵⁶ A closer look at the factors behind the growth, however, reveals that the agricultural growth was driven by the predominately irrigated areas.¹⁵⁷ The semi-arid zones, which remained highly dependent on rains besides bore-wells, kept a comparatively low productivity.

Official figures show a growth of 39.86 percent in the Gross State Domestic Product (GSDP) of the agricultural sector from 2004-05 until 2010-11, but only if livestock, forestry and fishing are included.¹⁵⁸ The separate figures of agriculture indicate a more careful growth of 26.44 percent during the same period.¹⁵⁹

The statistical data does not distinguish between the impact on production from the irrigation sources canals, tanks and bore-wells. A. Amarender Reddy has shown that the coastal Andhra region continued having the highest value of agricultural production in the period after 2004.¹⁶⁰

¹⁵⁴ Focus group meetings in Aurepalle, April 2 2013; field investigator Dokur, 2013. Cheepurupalli Padalu (field investigator in Pamidipadu), 2013. Cherukuri in an interview, 2013.

¹⁵⁵ Focus group meeting, Aurepalle, April 2 2013, field investigator in Dokur, 2013. JC Agraharam received nine hours of free electricity in 2004, according to their field investigator.

¹⁵⁶ Yella Reddy, Gopinath Reddy, Rama Mohan, Ratna Kumar, Palanisami and Ratna Reddy in interviews 2013.

¹⁵⁷ From multiple sources, such as tanks, canals or wells.

¹⁵⁸ Government of Andhra Pradesh. *State Economy*. The numbers at constant prices, located at: <http://www.ap.gov.in/Other%20Docs/STATE%20ECONOMY.pdf>

¹⁵⁹ Government of Andhra Pradesh. The statistical data from 2009-10 until 2011-12 are official estimates.

¹⁶⁰ Amarender Reddy 2011:396.

Canals remained the dominant irrigation source for agriculture in this region.¹⁶¹ Therefore, it is likely that the major share of increased agricultural output occurred in canal command areas in the coastal Andhra region, while there was comparatively less growth or even decline in the semi-arid zones.¹⁶²

It may be correct that agricultural growth was enhanced by the free electricity policy through for instance conjunctive use of canal water and bore-wells in command-areas.¹⁶³ Free electricity did not, however, significantly contribute to bridging regional disparities. Y.S.R.'s efforts and promises of reaching out to rural populations of the semi-arid zones went unfulfilled in that respect. Rayalaseema had stagnant production and showed a relative decline compared to the coastal Andhra region in 2006-07.¹⁶⁴ Telangana had increased growth in the first years after the subsidy was implemented, but on the other hand had showed signs of catching up already from the mid-1990s.¹⁶⁵

Furthermore, there was normal or good rainfall in Andhra Pradesh during most of the period when the growth in agriculture in 2004-2009 occurred. Therefore, it is hard to isolate the impact from free electricity. It seems plausible that the *combination* of rains, free electricity and other government reforms made a positive impact on agriculture in areas of the state that already had good access to water. In the drought year 2011-12 there was an overall decline in agricultural growth from previous years.¹⁶⁶ The decline suggests that there would have been less growth without good rainfall.

Conclusion

When the government in Andhra Pradesh implemented free electricity in 2004, farmers' expectations were high in the semi-arid regions. In the years before 2004, three consequent drought years ruined harvests and left farmers in distress. Trapped in debt, some saw no other way out than to commit suicide. Economic growth in the state was uneven, and there were disparities between different regions and sectors of the state. Farmers' distress in semi arid zones of rural Andhra Pradesh was in grim contrast to the booming IT-industries of urban areas.

¹⁶¹ Srinivasa Reddy and Ratna Reddy 2012: 29.

¹⁶² Palanisami in an interview, 2013. Rama Mohan also argued that the productivity was low in rain-fed agriculture.

¹⁶³ Yella Reddy, Gopinath Reddy, Rama Mohan, Ratna Kumar in interviews 2013.

¹⁶⁴ Amarender Reddy 2011:396.

¹⁶⁵ Cf. Amarender Reddy 2011:396.

¹⁶⁶ Government of Andhra Pradesh.

The promises Y.S.R Reddy gave of free electricity and improvement of conditions in farming created expectations among some farmers that they could secure harvests through bore-well irrigation. A combination between improved rainfall and free electricity after 2004 encouraged some of them to put more money in agriculture. They invested substantial amounts of money from wages, remittances and bank loans in new machines such as bore-wells and tractors. Thus, free electricity contributed to an already existing trend of bore-well drillings. In the decades prior to 2004, bore-well agriculture was mostly done by the large-scale farmers of the forward castes. These farmers had the financial capacities to sustain competitive drilling and high investments.

Small and marginal farmers among the BCs, and some SCs, could access money through remittances, government programs and loans. Some of them invested this money in bore-wells hoping to do agriculture, both of which had high status in the villages. In that respect, the newcomers drilling bore-wells were latecomers. Small and marginal farmers were financially vulnerable, and their attempted entry came in the midst of competitive drillings. To be able to survive the intensified competition, many farmers were obliged to borrow money privately at high debt rates. Because of the limited financial buffers of small and marginal farmers, a failed harvest due to lack of water or erratic rainfall would leave them in a very difficult situation.

As we saw above, however, erratic rainfall and water scarcity were among the recurring problems in semi-arid zones. The hard rock geology of Andhra Pradesh would make prolonged groundwater pumping unsustainable. I will discuss how the increased number of bore-wells contributed to sinking groundwater levels and increasing numbers of failures in chapter 4.

4 In decline after 2009

In the previous chapter we saw how the free electricity policy resulted in increasing numbers of farmers in Andhra Pradesh drilling for bore-wells. The combination of good rains, free electricity and other government programs appears to have had a positive impact on agriculture that lasted until around 2009. Medium- and large-scale farmers did, however, have a disproportional capacity to sustain investments in bore-well agriculture. All farmers had the same problems of bore-well failures, on the other hand.

After the death of Y.S.R. Reddy in 2009 there were decreasing supplies of electricity and water for agriculture. The death of this strong leader coincided with renewed drought from approximately 2010 and onwards. Therefore it is difficult to decide the actual impact Y.S.R. Reddy's death had on the worsening situation for agriculture in the state.

The quantity and quality of the electricity supplies for agriculture after the new state government took over after the death of Y.S.R. Reddy in 2009 are debated issues. As there were differing accounts of the electricity supplies, it seems unlikely that a consistent supply of, for instance, seven hours per day was delivered throughout Andhra Pradesh.

The increased number of bore-wells contributed to an over-extraction of water. As a result of over-extraction and renewed drought, bore-wells ran dry in the state. Decreasing electricity supplies after 2009 further reduced the access to irrigation water.

The availability of groundwater remained a major constraint on agriculture. Because of these natural constraints, there was an optimal number of bore-wells in a given area. Bore-well digging beyond that sustainable level caused declining yields and bore-well failures.

It seems likely that the free electricity policy had an adverse effect on the state economy by contributing to an electricity crisis that caused a steep fall in industrial rates of growth. Thus, the subsidy came at a high cost, although the generally rising consumer prices might have overshadowed the effect of free electricity for farmers. Still vulnerable to fluctuating sales prices of agricultural produce, some farmers found no other solution than to migrate to the cities.

There were challenges to the accuracy of the available information about the status of groundwater development in Andhra Pradesh. The assessment units used in the official time data were not the same over time.¹⁶⁷ Because there were variations in the natural settings also within the Mandals, one must be careful in giving too much weight to the official groundwater information.¹⁶⁸ The aggregate estimates based on observation wells were not always in accordance with the village-level situation of declining groundwater levels and dry bore-wells.

The minor irrigation census was carried out every fifth year from 1987-88 in order to build up a systematic database on minor irrigation in India.¹⁶⁹ In the evaluation conducted in 2010, Indian Agricultural Statistics Research Institute pointed out that there was room for improvements in the data quality and methodology of the census.¹⁷⁰ One such issue was the lack of schedules for collecting data on irrigation schemes that covered several villages. The schedules applied were limited to schemes that covered only one village.

Decreasing access to water and electricity

After electricity became free in 2004 the quality and hours supplied were contested issues. Even though it seems that the supplies were inconsistent from the onset, the respondents from the four villages of this study generally reported decreasing electricity access after 2009. For instance, the focus group members in Aurepalle said that the electricity supplies gradually declined after this year, and were reduced to between one and a half to four hours a day in that year.¹⁷¹ They attributed the negative development to renewed drought conditions. Pamidipadu experienced a similar problem of erratic electricity supplies delivered in short spells, and in JC Agraharam the electricity supplies gradually decreased from nine to four hours at unpredictable times.¹⁷²

A representative from Andhra Pradesh Central Power Distribution Company Limited (APCPDCL) in Hyderabad, which is one of the four state-run distribution companies called Discoms in Andhra Pradesh, on the other hand said there was a seven hour supply to agriculture in general. Some days the amount could be smaller to maintain the electricity grid.

¹⁶⁷ One reason is that the administrative unit *Taluk* was changed when the state was reconstituted into *Mandals* in 1985. All Mandals were included among the assessment units in 1993. Cf. Srinivasa Reddy and Ratna Reddy 2012: 10, 12.

¹⁶⁸ Srinivasa Reddy and Ratna Reddy 2012: 10.

¹⁶⁹ Bhatia, Sud, Mathur, Chandra and Lal 2010: Foreword.

¹⁷⁰ *Ibid.*, p. 2.

¹⁷¹ Focus group meeting, Aurepalle, April 2 2013; focus group meeting, Aurepalle, March 8 2013.

¹⁷² Cheepurupalli Padalu (field investigator in Pamidipadu), 2013; field investigator JC Agraharam, 2013.

In such cases, the additional amount would be delivered on the succeeding day.¹⁷³ The official pointed to the supply regulation, and said that the groundwater levels would have to be given time to recharge. Farmers could not apply all the water at once, was APCPDCL's stance. In some areas there could be an uninterrupted electricity supply for seven hours, whereas electricity came in spells of three and four hours daily in other areas. In the peak season of March and April there was a very high electricity demand for the Rabi (spring) crop, and for schoolchildren who had to study late for exams. The sum amounted to an additional need of 15 to 20 percent electricity supply, which could imply interruptions.¹⁷⁴ The official from APCPDCL granted that industry and other users than agricultural, such as domestic consumers in rural and urban areas, suffered from the lack of supply. He said that electricity supplies for farming had high priority to prevent crop failures, and field-inspectors were instructed that farmers should not suffer from shortages.

If the electricity was delivered in short spells as farmers experienced in Pamidipadu and Dokur, the outcome would most likely be crop damage. The reason was that there would be excessive watering of one part of the plot, and lack of water in the other part of the plot.¹⁷⁵ Such a problem occurred in Pamidipadu, where the farmers were unable to irrigate the whole plot at the same time because of the existing time gaps, resulting in crop failures.¹⁷⁶ The focus group members in Aurepalle claimed they were simply unable to irrigate in 2013, as they lacked both water and electricity.¹⁷⁷

In Aurepalle in 2013, the three hours of electricity available at night was insufficient for irrigating the water-intensive paddy, and the bore-wells could only be used for providing water for livestock.¹⁷⁸ Furthermore, farmers and agricultural laborers preferred not to work their fields at night, fearing snakes and electricity shocks.¹⁷⁹

One reason for the decreasing hours of electricity supplies was most likely that rainfall in the state improved from previous years between 2004-05 and 2007-08, but decreased again from around 2011-12.¹⁸⁰ When the rainfall was high, the electricity supplies increased accordingly.¹⁸¹ In years of less rainfall the electricity supplies decreased.

¹⁷³ An official of APCPDCL, 2013.

¹⁷⁴ An official of APCPDCL, 2013.

¹⁷⁵ Amarender Reddy in a conversation 2013.

¹⁷⁶ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

¹⁷⁷ Focus group meeting, Aurepalle, March 8 2013.

¹⁷⁸ Focus group meeting, Aurepalle, April 2 2013.

¹⁷⁹ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013

¹⁸⁰ Cherukuri and field investigator in Dokur in interviews 2013, focus group meeting Aurepalle, March 8 2013.

¹⁸¹ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

It appears that the years of sufficient rainfall were more of an exception than a rule. Erratic rainfall and a cycle of drought every three years in a span of five years became normal in Mahabubnagar.¹⁸² Rainfall also showed a decreasing trend in Prakasam.¹⁸³

Decline in electricity supply was caused by the negative effect from drought on water-reserves in the dams and hydro-electricity throughout South-Asia.¹⁸⁴ The supply side issue was a general problem of energy generation connected to hydro-electricity. Nepal, another South Asian country, experienced similar problems to India. There, underinvestment and political turmoil combined with natural disasters such as drought and floods resulted in an energy crisis.¹⁸⁵ Another problem in South-Asian countries was the increased demand for air-condition cooling from urban centers during the hottest months of drought years.¹⁸⁶ The connection between rainfall and electricity supply may thus be one explanation for why three of the test- villages reported decreasing electricity supplies after the death of Y.S.R. Reddy in 2009.¹⁸⁷

Several other factors, however, affected the electricity supplies. A second factor was the financial strain the state government created on the electricity sector by only partially paying the subsidy amount for the free electricity subsidy.¹⁸⁸ This meant that unfinished electricity-generating projects like the Pulichintala Hydroelectric project and Lower Jurala Hydro Electric Project came to a halt. The third factor was the negative effect on the electricity generation from the political turmoil in the supply areas of coal for electricity, and a 42 day strike conducted by the separatist movement for Telangana.¹⁸⁹ Following 2004 the electricity demand also increased beyond what the state could supply.¹⁹⁰

¹⁸² Field investigator in Dokur, 2013. Central Ground Water Board 2007 (A): 7.

¹⁸³ Central Ground Water Board 2007 (B): 4.

¹⁸⁴ Amarender Reddy in a conversation, March 3 2014.

¹⁸⁵ Sovacool, Dhakal, Gippner and Bambawale 2013: 497.

¹⁸⁶ Amarender Reddy in a conversation, March 3 2014.

¹⁸⁷ In 2013. Focus group meetings in Aurepalle, April 2 2013; Cheepurupalli Padalu (field investigator in Pamidipadu), 2013; field investigator in JC Agraharam, 2013.

¹⁸⁸ «Discoms fail to clear their dues to Genco: APGenco unable to fund projects», *Deccan Chronicle*, March 20 2013.

¹⁸⁹ Gopinath Reddy in an interview, 2013.

¹⁹⁰ The gap between supply and demand was confirmed to be above 2000 MW in the state as of March 2013 by an official of APCPDCL, 2013.

A 2010-report showed that despite a tenfold increase of energy consumption for pumping water in Andhra Pradesh, the irrigated area only doubled after 1980.¹⁹¹ If these numbers are correct they reveal a significant decline in pumping efficiency and possibly that many of the bore-wells became deeper, thereby contributing to the increased electricity demand in the state. Below is a table showing how the gross and net area irrigated under groundwater increased after the free electricity policy became implemented.

Table 5: Gross area and net area irrigated under groundwater¹⁹²

	Gross Area in 100.000 Ha	Net Area in 100.000 Ha
2004-05:	25.63	19.01
2005-06:	27.96	19.86
2006-07	28.91	20.72
2007-08	31.74	22.86
2008-09	34.17	23.24
2009-10:	33.43	22.84
2010-11	36.72	24.61

The table shows gross and net irrigated area under groundwater in Andhra Pradesh. Net irrigated area was the area irrigated once a year for a particular crop, while gross irrigated area was the total irrigated area under crops, whether for one or several crops in a year. The area irrigated under groundwater did increase in Andhra Pradesh after 2004, which seems at least in part facilitated by the free electricity policy.

As we saw in chapter 3 the extension remained limited, with water being a major constraint.¹⁹³ For the individual farmer in the village, the implication of the electricity subsidy may have been lowered operation costs.¹⁹⁴ Regardless of how many new bore-wells farmers drilled in a given area, when the total potential of water extraction was reached, the result was less yield of water.¹⁹⁵ Therefore, Amarender Reddy argued that there was an optimal number of bore-wells in a given village.¹⁹⁶

¹⁹¹ The World Bank 2010: 23-24.

¹⁹² Table made and compiled by Radhika Cherukuri, NIRD, 2013.

¹⁹³ Kumar, Ratna Reddy, Narayananoorthy, Sivamohan 2013: 76.

¹⁹⁴ As argued by for instance Palanisami in an interview, 2013.

¹⁹⁵ Mohan Rao in a briefing 2013.

¹⁹⁶ Amarender Reddy in a meeting 2013.

To give an example, the number of bore-wells rose in JC Agraharam from 200 in 2001-04 to 350 in 2009-12. Still, there was not much change in the total access to water in this village. All the open wells dried up, and even though a village pond existed it was not in use. Electric bore-wells became the only source of irrigation water in the village.¹⁹⁷ And in Aurepalle, despite the existence of 300 bore-wells the farmers said in 2013 that these were hardly of any use to them anymore as an irrigation source for crops, because there was no water.¹⁹⁸

High cost, questionable impact

The free electricity policy had an adverse effect on state economy. As already argued the state government pushed the electricity sector into debt by only partially covering the agricultural subsidies. *The Times of India* labeled the situation in the state electricity sector an acute crisis in 2013. This electricity crisis was referred to as the direct cause of the disastrous performance of the state industrial sector, which experienced a steep decline in growth rates from 7.71 percent in 2011-12 to 0.73 percent in 2012-13.¹⁹⁹

The free electricity subsidy came at a high cost, and in reality it was a cross-subsidy borne by other sectors, as I will show in this section. Moreover, the electricity subsidy for agricultural consumers in Andhra Pradesh was the highest given by any state in 2007-08 and 2008-09.²⁰⁰

Dinesh Kumar has studied the energy-groundwater nexus and published extensively on groundwater management. He argued that the supply of electricity for agriculture came at the expense of the urban population and industries.²⁰¹ The latter had no priority, such as assurances of a seven hour supply, yet experienced increased electricity taxes following 2004. For instance, the electricity tax for industrial electricity supplies nearly doubled between 2010 and 2012.²⁰² The tax rate for industries was however not exceptional on a national basis, at least not until mid-2012.

What was remarkable about the free electricity subsidy for agriculture in a national cost perspective, was that at Rs. 48, 676, 500, 000 and Rs. 68, 074, 100, 000 in the years 2007-08 and 2008-09 respectively, it was the highest such subsidy given by any Indian state

¹⁹⁷ Field investigator in JC Agraharam, 2013.

¹⁹⁸ Focus group meeting, Aurepalle, March 8 2013.

¹⁹⁹ «Acute power crisis blacks out state's growth», *The Times of India*, March 14 2013.

²⁰⁰ Planning Commission 2011: 159.

²⁰¹ Kumar in an interview 2013. See also «Power shortage costs 2 lakh jobs as 6k units down shutters», *The Times of India*, April 2 2013.

²⁰² Andhra Pradesh Electricity Regulatory Commission 2010: 8. See also: «Industrial tariff lower than in other states», *The Times of India* (Kerala), July 31 2012.

in those two years.²⁰³ 2009 was an election year in India. The large size of electricity subsidies was concurrent with Badiani and Jessoe's finding that politicians increased subsidies to agriculture in the year before an election.

Roughly one fourth and one fifth of the amounts were uncovered subsidies after interventions like cross-subsidies and subvention from the state in 2007-08 and 2008-09.²⁰⁴ The outcome was that the electricity sector had to take the loss, and in either case the financial burden would have to be carried by other sectors than agriculture.

Adding to that burden were the erratic electricity supplies, which caused the shutdowns of more than 6000 small and medium sized industrial companies in the state after 2011.²⁰⁵ In 2014 industries had to shut down completely for one working day every week.²⁰⁶ The electricity deficiencies reached between 20 million and 30 million units each day caused by increased demand for agriculture during the Rabi season.

Due to the gap between supply and demand the state was forced to purchase electricity from other Indian states amounting to Rs. 60, 000, 000, 000 in 2012-13, a practice which was criticized by the focus group meeting in Aurepalle for being economically inefficient.²⁰⁷ If the industries and industrial growth were slowed down by the electricity crisis, the adverse impact was likely to reach the agricultural sector. Lowered revenues for industries would come to mean lower taxes, and thereby lower state revenues for maintenance of the electricity sector.

The economic costs of the free electricity subsidy in Andhra Pradesh were high. The benefits received by farmers were, however, questionable because of higher costs due to inflation and unfavorable sales prices for agricultural products. New data from *India Human Development Survey* suggests an average median growth in real household income of 7.2 percent per person in India's rural areas.²⁰⁸ The preliminary analysis of the data did not reveal the drivers of the growth, which could be remittances from relatives in urban occupations, increased wage rates for agricultural workers, or growth in income for farmers selling certain products, like paddy. Rahul Sen, however, said that the rural inflation rate of ten percent annually reduced the purchase rate of farmers.²⁰⁹ Even if they had an increased

²⁰³ Planning Commission 2011: 159.

²⁰⁴ Ibid., pp. 117-118 and 164-165.

²⁰⁵ «Power shortage costs 2 lakh jobs as 6k units down shutters», *The Times of India*, April 2 2013.

²⁰⁶ «Duration of power cuts increased», *The Hindu*, March 1 2014.

²⁰⁷ Focus group meeting, Aurepalle, April 2 2013. «Will free power ruin Congress in Andhra Pradesh?», *Times of India*, January 3 2013.

²⁰⁸ *India Human Development Survey*. The full survey had not yet been released and verified in April 2014. See Dubey and Vanneman 2014. «An inclusive growth policy», *The Hindu*, April 5 2014.

²⁰⁹ Sen in an interview, 2013. The rural inflation rate was above 10 percent at the end of 2013, cf. Government of India, Central Statistics Office 2014.

income, they would have no more purchasing power. Gopinath Reddy and S. Galab of CESS supported the argument that the price regime was unfavorable to farmers.²¹⁰ Input costs were generally rising, and volatile. S. Galab thought that despite reforms in education and health, private expenditure linked to these sectors rose because of inadequate public supply of health and education services. Risks from increased private investment in agriculture, exposure to market fluctuations, together with rising aspirations among farmers still caused distress.²¹¹

The field investigator in Pamidipadu said that input costs rose steeply after the death of Y.S.R. Reddy in 2009, and that several farmers died because of the unstable prices and electricity supplies. The cost of some agricultural inputs increased by as much as 200 percent according to this source, although official numbers indicate a general rural inflation rate of around 37.5 percent in Andhra Pradesh since the base year in 2010.²¹² The field investigators in Pamidipadu and JC Agrapharam said that after the death of Y.S.R. Reddy crop loans declined, and crop insurances and agricultural subsidies ceased to be granted.²¹³ In Pamidipadu, the sales prices of some products fell by as much as 50 percent.²¹⁴ The lack of subsidies seems to have added to an already difficult situation for some farmers in these villages after 2009.

To give an illustration of how the farmers were affected by price fluctuations, two farmers in Pamidipadu might have been cultivating chili and tobacco respectively. They might have changed their cropping pattern towards these commercial crops because of the extended irrigation facilities and good rains after 2004. But with the fluctuating prices, depending on luck and storage facilities, the chili cultivating farmer might have incurred losses and the tobacco farmer was almost sure to have made losses due to a plunge in tobacco prices.²¹⁵ The two of them might, as several farmers did in the village, have invested substantial amounts in agriculture because of the free electricity policy.²¹⁶ Faced with a rural inflation rate of around ten percent and unfavorable prices, they might have experienced difficulties in making even small profits.

²¹⁰ Gopinath Reddy and Galab in interviews, 2013.

²¹¹ Galab in an interview, 2013.

²¹² Cheepurupalli Padalu (field investigator in Pamidipadu), 2013. Government of India, Central Statistics Office 2013a.

²¹³ Field investigator in JC Agrapharam, 2013, Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

²¹⁴ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

²¹⁵ See «Chilli farmers going for distress sale» in *The Hindu*, February 19 2013. See also: «Tobacco ryots launch relay fast for MSP», *The Hindu*, June 18 2011. Compared with prices from 2004 until 2013 at

<http://agmarknet.nic.in>, Government of India, Ministry of Agriculture, Directorate of Marketing and Inspection.

²¹⁶ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

A third farmer in the same village, or in Aurepalle, might have opted for cotton cultivation. With too low access to water for paddy cultivation, shifting to the commercial crop cotton was an alternative which could secure favorable sales prices, though cultivated at high risk. Weather was always a risk factor. Moreover, there was failure in 71 percent of the area of Andhra Pradesh sown with Bt cotton crop in 2011, according to government estimates.²¹⁷

Bt cotton is a cotton type which showed a high degree of resistance to bollworms.

In Aurepalle, the focus group members on April 2 stated that more farmers started growing cotton after Bt cotton was introduced in 2005. They thought fifty percent of the farmers cultivated cotton at that time.²¹⁸ The focus group members, however, said in 2013 that there was a «forced» shift to cotton among many farmers, due to lack of water. They estimated that up to 90 percent of farmers in the village cultivated cotton, of which Telangana was the major producer in the state.²¹⁹

The cotton farmer seems the most likely among the three to have succeeded at getting a good price if he had a decent harvest and could get it to the market, but as shown in the three illustrations even informed decision-makers put their investments at risk in what resembled a gamble. Two of the three farmers in the illustration were likely to have lost because of unfavorable sales prices, or to have had their profits «eaten» by inflation. Farming would have been an unviable option for many because of the rising costs had there been no electricity subsidy.²²⁰ The policy did, however, contribute to making some farmers investing substantially in cultivation of commercial crops due to expectations that went unfulfilled.

Continued agricultural distress

After a prolonged drought, the situation was desperate for farmers of all landholding sizes when the free electricity policy was implemented in 2004.²²¹ Nearly ten years later, in 2013, the situation in the rain fed areas depending on bore-wells was still described as out of control, as these areas remained vulnerable to rain.²²²

²¹⁷ Parsai 2012. «Protests mark 10th anniversary of Bt cotton», *The Hindu*, March 27 2012.

²¹⁸ Focus group meeting, Aurepalle, April 2 2013.

²¹⁹ Focus group meeting, Aurepalle, March 8 2013, focus group meetings in Aurepalle, April 2 2013.

²²⁰ Yella Reddy and Sen in interviews, 2013. Compared with data from Government of India, Central Statistics Office 2013.

²²¹ Sainath, «Sinking bore-wells, rising debt», *The Hindu*, Jun 23 2004.

²²² Ratna Reddy in an interview, 2013.

The policy may have resulted in a decline in the resource base of the poor lower-caste people who worked as agricultural laborers in the villages. They were landless, and survived on common property resources such as water, which gradually diminished.²²³ The neglect of supplemental water sources such as watershed harvesting systems had a detrimental effect on their water security.²²⁴

In effect, groundwater became de facto privatized due to bore-well extension. The reason is that groundwater, despite water being a common pool resource in its shared nature, was treated as private property.²²⁵ On the other hand, the legal framework of groundwater remained poorly defined. In practice, the implication in many cases was that the farmers who owned bore-wells could extract whatever water was available.²²⁶

Faced with fluctuating prices and continued agricultural distress due to droughts and bore-well failures, the solution for some of the people living in the villages was migration to the cities. In drought-prone Dokur agricultural income declined as the sources for irrigation dried up.²²⁷ Ultimately, some people shifted out from agriculture to work in cities such as Hyderabad because of the reduced availability of water. Many of the urban migrants wanted to return to the villages if the rains changed in favor of agriculture.²²⁸

Some of the landholders who remained in the villages had to depend on labor earnings in addition to their farm income. Remittances from relatives in other occupations contributed to increased household income in Dokur, even if farming became less viable.²²⁹ In JC Agraharam some BCs received money from relatives who worked in the army, which they invested in agriculture and used to install bore-wells.²³⁰ The field investigator in JC Agraharam said that their social status rose, as they successfully managed to acquire and cultivate land doing productive bore-well farming.

²²³ Prakash in an interview, 2013.

²²⁴ Prakash in an interview, 2013. Watersheds were commonly used by people and livestock in the villages for their livelihoods, see Wani et al. 2008. The focus group meeting on April 2 2013 in Aurepalle, and the field investigator in Dokur described problems in their watershed systems, such as suspicions of corruption and lack of maintenance.

²²⁵ Joy and Paranjape 2009: 216. There is an ongoing debate about defining groundwater as a common pool resource versus the practice of treating it as private property.

²²⁶ Kumar and Singh 2007: 82.

²²⁷ Krishna, Mohan Rao, Nageswara Rao, Kiresur and Bantilan, 2011: 2.

²²⁸ Ibid, p. 3.

²²⁹ Ibid.

²³⁰ Field investigator in JC Agraharam, 2013.

Renewed drought

As described earlier, there was generally good rainfall in Andhra Pradesh between 2004 and 2009. The rainfall decreased again from around 2009, with renewed drought-conditions from around 2011-12 and onwards. The Government of Andhra Pradesh declared 665 Mandals in 21 out of 23 districts drought affected after the poor monsoon in 2011.²³¹ The rainfall in the state picked up again in 2013. Still, 119 Mandals, including three in Mahabubnagar, were declared drought-affected because of rainfall deficiency.²³²

In Dokur frequent droughts made a negative impact on the dry land crop production, according to their field investigator in 2013. In this village, as elsewhere in semi-arid areas of the state, delayed monsoons and erratic rainfall during critical stages of cultivation created problems in farming.²³³ Also in a different corner of the state, Pamidipadu, there were experiences of poor and uneven rainfall, especially between 2011 and 2013 again.²³⁴ With the water shortages that emerged as a consequence of the renewed drought, the only survival strategy for farmers who remained in the villages was shifting the cropping pattern.²³⁵ In Mahabubnagar, the farmers always shifted their cropping patterns depending on the climate and irrigation sources.²³⁶ After 201-12 there was a lowered access to water in Aurepalle, and the cultivation of paddy and several other food crops declined as a result.²³⁷ In 2013 there were just four paddy farmers left in the village, while nearly all farmers had shifted to cotton, according to the focus group. As we saw above one reason was the introduction of Bt Cotton in 2005-06, but they still stated that farmers would have preferred growing maize and paddy because of their fodder value, if irrigation had been available.²³⁸

In the opinion of the focus group in Aurepalle in 2013 the bore-wells were of little use for irrigating crops, since there was neither a sufficient supply of electricity nor water. Cotton was cultivated almost without irrigation.

²³¹ «13 more mandals declared drought-hit in AP», *The Hindu Business Line*, November 23 2011.

²³² Sudhakar Reddy. «119 mandals declared drought-hit in Andhra Pradesh», *The Deccan Chronicle*, January 4th 2014.

²³³ Field investigator in Dokur, 2013. Sishodia also said in 2013 that the rainfalls were very erratic and insufficient. He was working on the Kothapally watershed in Rangareddy district, Telangana.

²³⁴ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

²³⁵ Focus group meeting with SHGs, Aurepalle, April 2 2013.

²³⁶ Central Ground Water Board 2007a: 5.

²³⁷ Focus group meeting, Aurepalle, March 8 2013.

²³⁸ Focus group meeting, Aurepalle, April 2 2013.

In Dokur the rate of paddy cultivation also declined, and there was a slight diversification with a shift towards less water intensive crops and horticulture such as pigeon pea, groundnut, castor and citrus.²³⁹ Shifting towards maize and cotton during water shortages remained widespread after 2004, because of the high number of subsistence farmers in Andhra Pradesh.²⁴⁰

Table 6: Cropping pattern in Dokur²⁴¹

Kharif 2004		Rabi 2004		Annual/perennial 2004	
Crops	Area (acres)	Crops	Area (acres)	Crops	Area (acres)
Paddy	350	Paddy	250	0	0
Castor	40	Castor	0	0	0
Pigeon pea	35	Sorghum	20	0	0
Cotton	20			0	0
Sorghum	30			0	0

Kharif 2011-12		Rabi 2011-12		Annual/perennial 2011-12	
Crops	Area (acres)	Crops	Area (acres)	Crops	Area (acres)
Paddy	270	Paddy	120	Mango	15
Castor	100	Castor	10	Citrus	20
Pigeon pea	50	Groundnut	70		
Cotton	30				

Farmers might have expected too much from the policy of free electricity and initially opted for cropping patterns that would normally be unsustainable in areas of less rainfall. It is difficult to say if their expectations colored their perception of the policy. Moreover, farmers and field investigators might have ignored the impact from supplemental, or protective, irrigation from private bore-wells. In semi-arid areas of low rainfall, farmers could use bore-well irrigation as a supplement to rain to apply sufficient amounts of water to protect dry land crops from drought.

²³⁹ Field investigator in Dokur, 2013.

²⁴⁰ Praveen Rao in an interview, 2013.

²⁴¹ Table made and compiled by field investigator in Dokur, 2013.

Cotton, chickpea, groundnut and maize were examples of such crops, which were drought-resistant and normally yielded without irrigation. It remains outside the scope of this thesis to undertake a detailed research on the effects of supplemental irrigation.

The technique was only used by farmers to supplement rain water during years of rainfall failure. They would not be able to maximize crop yields or do extensive paddy farming, since full irrigation was required to do so. If there was a gap between farmers' expectations and results of free electricity policy, it may explain why they did not emphasize the impact from supplemental irrigation, which was conditioned by availability of water in any case. First, farmers saw the shift towards irrigated dry land crops as a survival strategy, and not necessarily the preferred option. Second, the electricity was delivered in short spells in 2013, so farmers ran diesel-pumps during time gaps to make sure they could irrigate their whole plot.²⁴² Free electricity was only one factor which affected the farmers' choice of crops, together with water availability, market prices and new seeds. Last, the financial losses due to bore-well failures might have outweighed the benefits from supplemental irrigation.

Crop diversification, coupled with a permanent decline of groundwater levels, could be a sign of groundwater overdraft.²⁴³ In Coastal Tamil Nadu and North Gujarat over-extraction led to a decline of what the irrigation expert Tushaar Shah termed the *groundwater socio-ecology*.²⁴⁴ The term can be understood as an economic system based on irrigation farming. An uninterrupted overdraft led to declining agricultural growth and the burst of economic bubbles in the areas mentioned.

Shah argued that a gradual divergence between private costs for farmers of pumping water, and social costs in the form of subsidies borne by governments and other sectors, was a major symptom signaling the fall of local groundwater economies.²⁴⁵ Private and social costs related to irrigation started diverging from the moment agricultural consumers ceased to be billed for their electricity use in Andhra Pradesh. Even if electricity use became free, the cost was still there. The gap between private and social costs only widened with the declining water levels, because extracting the water from deeper bore-wells required more energy.

²⁴² Cheepurupalli Padalu, the field investigator in Pamidipadu, 2013.

²⁴³ Shah 2009: 7-8.

²⁴⁴ Ibid.

²⁴⁵ Ibid.

Higher electricity consumption implied higher costs, but farmers were shielded from these because of the free electricity subsidy.²⁴⁶ Hence, the situation in Andhra Pradesh showed similarities to what happened in Coastal Tamil Nadu and North Gujarat.

Increasing well-failures after 2009

Farmers were encouraged to drill more bore-wells by the free electricity policy, as we saw in chapter 3. The assertion was that an increased density of bore-wells within in a given area could lead to higher incidents of bore-well failures, which happened in Aurepalle when 170 new bore-wells failed in 2012. Moreover, the number of functioning bore-wells was reduced to a yearly average of 50, a number which fluctuated between the seasons.²⁴⁷

The situation in the village in 2013 contrasted with the comparatively good years between 2005 and 2008, when nearly all 200 bore-wells worked.²⁴⁸ Ironically, the number of bore-wells was around 50 in the village when only the upper castes had access to them. Ten years of costly drillings seemed to have landed the farmers back where they started.

Besides drought, well competition frequently caused bore-wells in hard rock areas to dry up.²⁴⁹ When bore-wells in such areas were too closely spaced, well-interference and lowered yields of water were usually the first symptoms. As we remember from Aurepalle, some farmers used non-scientific methods to search for water, and installed bore-wells at shorter distances than 200 meters. The farmers had no assurance that they would hit water-bearing fractures, or that they hit them well. The most plausible reason for the low number of functioning bore-wells was therefore that the ill-connected wells dried up seasonally.²⁵⁰ Running motors under dry conditions generally resulted in motor burnings at exorbitant costs to farmers.

Farmers who drilled bore-wells in violation of the prescriptions were unable to obtain credit from official financial institutions, and for some of them dry wells led to private debt that could not be repaid.²⁵¹ Still, partially dried up existing bore-wells caused by too close spacing may not be the only reason why 170 new bore-wells failed in Aurepalle in 2012. Some of the new failures may have been caused by failure to hit water-bearing fractures at all, while others could be caused by declining groundwater levels.

²⁴⁶ Cf. World Bank 2010: xii.

²⁴⁷ Focus group meeting in Aurepalle, April 2 2013.

²⁴⁸ Focus group meeting in Aurepalle, April 2 2013.

²⁴⁹ Rama Mohan 2012: 14. Nearly 85 percent of Andhra Pradesh is underlain by low-storage hard rocks. See for instance Srinivasa Reddy and Ratna Reddy 2012: 5.

²⁵⁰ Cf. Rama Mohan 2012: 15.

²⁵¹ A major reason for agricultural distress in Mahabubnagar, see Central Ground Water Board 2007a: 3.

Declining groundwater levels

The four test-villages reported declining groundwater levels in 2013, which is evident from the following table, but there was a limit to how far the groundwater levels could dip in hard rock areas such as in Andhra Pradesh.²⁵² For instance, farmers in Aurepalle dug down to 90 meters in 2012. According to information from the Central Ground Water Board they were unlikely to hit major potential aquifer zones below 80 meters.²⁵³

Table 7: Declining water levels²⁵⁴

Village	1970	1980	1990	2000	2012
Aurepalle	Open wells 40-50ft	Open wells 40-50ft	Bore wells 80-90ft	Bore wells 100-150ft	Bore wells 250-300ft
Dokur	Open wells 40-50ft	Open wells 60-75ft	Bore wells 90-100ft	Bore wells 150-200ft	Bore wells 200-250ft rarely 300ft
JC Agraharam	Open wells 30ft	Open wells 40 ft.	Bore wells 150ft	Bore wells 150-175ft	Bore wells 350-375ft
Pamidipadu	Open wells 15-20 ft	Open wells 25 ft.	Open wells 30 ft.	Bore wells 175-200 ft.	Bore wells 200-250ft

In Dokur, a major turning point came in 2007-2008, after which the lack of rain made the water levels fall so sharply that it became difficult to construct bore-wells. After 2010 approximately 80 percent of new bore-wells failed in this village, and farmers who dug deeper than 150 feet, or 45 meters, encountered only stone.²⁵⁵ The Central Groundwater Board confirmed that there was erratic and deficient rainfall in Mahabubnagar and Prakasam District, and that it contributed to the declining groundwater levels.²⁵⁶

Although acknowledging the fact that poor rainfall caused declining water levels and well failures, several researchers suggested that over-exploitation beyond sustainable recharge also made the water levels fall.²⁵⁷ The negative development in the villages was consistent

²⁵² Cf. Central Ground Water Board 2007a: 12.

²⁵³ In Mahabubnagar district. Central Ground Water Board 2007a: 12.

²⁵⁴ ICRISAT / field investigators, 2013.

²⁵⁵ Field investigator in Dokur, 2013.

²⁵⁶ Central Ground Water Board 2007a: 7; Central Ground Water Board 2007b: 1.

²⁵⁷ Ratna Reddy, Palanisami, Ravindra, Yella Reddy, Prakash, and Kumar in interviews, 2013.

with a national trend of a rapid growth in bore-wells resulting in declining water tables since the 1980s.²⁵⁸ A likely conclusion is that the increased spread of bore-wells aggravated the effects of drought, causing the groundwater levels to fall even deeper.

In Andhra Pradesh the number of over-exploited villages more than doubled in the six years between 2002 and 2008.²⁵⁹ All the three regions were concerned, although Telangana experienced nearly a tripling of over-exploited villages.²⁶⁰ The available research literature was supplemented by newspaper stories of bore-well failures and declining groundwater levels all over the state: From Nalgonda, Medak, Rangareddy and Nizamabad in Telangana, Anantapur in Rayalseema, to West Godavari in the Coastal Andhra Region.²⁶¹

Furthermore, a 2008-assessment showed that non-command areas reached a critical level of groundwater development in Andhra Pradesh.²⁶² A Stage of Groundwater Development (SGD) below 70 percent was defined as safe usage, and areas that were not covered by canal irrigation exceeded this limit.²⁶³ The state still fell under the categorization of safe usage, but the stage of groundwater development went up to 41 percent in 2007, from a mere 28 percent in 1985.²⁶⁴

A growing usage of groundwater in Andhra Pradesh between 2004 and 2013 looks like an undisputable fact, but did free electricity cause the over-exploitation of it? Researchers were reluctant to draw a line between free electricity and declining groundwater levels because of the limited supply of electricity. V. Ratna Reddy saw electricity subsidies in general as harmful for the environment.²⁶⁵ Still, he and the respondents Yella Reddy and Rajendra Sishodia thought the low electricity supplies limited the environmental impact.²⁶⁶ However, K. Palanisami argued that pumping beyond the sustainable yield caused depletion of groundwater in Mahabubnagar, and therefore the free electricity was harmful for the environment in that particular district.²⁶⁷ Here, there was a reduction in the water supply after 2010, which negatively affected farmers' economic well-being due to well-failures. Over time, the situation in the farmer communities worsened because of the changed access to

²⁵⁸ World Bank 2010: xii.

²⁵⁹ Srinivasa Reddy and Ratna Reddy 2012: 25.

²⁶⁰ Ibid.

²⁶¹ Ibid., p. 14. Sainath, «Sinking bore-wells, rising debt», *The Hindu*, Jun 23 2004; «Crisis bells ring as ground water levels dip», *Times of India*, March 14 2013.

²⁶² GoAP, Groundwater Department, Hyderabad 2012, «Groundwater Resource Andhra Pradesh» referred to in Srinivasa Reddy and Ratna Reddy 2012: 14.

²⁶³ SGD indicates groundwater status. Srinivasa Reddy and Ratna Reddy 2012: 14.

²⁶⁴ In all of Andhra Pradesh, cf. Srinivasa Reddy and Ratna Reddy 2012: 15.

²⁶⁵ Srinivasa Reddy and Ratna Reddy 2012: 32.

²⁶⁶ Ratna Reddy, Yella Reddy and Sishodia in interviews, 2013.

²⁶⁷ Palanisami in an interview, 2013.

water. JC Agraharam in Prakasam district experienced a rapid increase in the number of bore-wells after 2004, followed by falling groundwater levels.²⁶⁸ The district topped the list of declining groundwater levels in Andhra Pradesh in 2012.²⁶⁹ Over-extraction was named as the cause of this trend.

That was a sign that the free electricity policy had a negative environmental impact in other parts of Andhra Pradesh, but the scope is difficult to establish and open to interpretation. To the extent that free electricity contributed to an increased use of irrigation water, it was a factor causing declining water levels. Low electricity supplies may have limited the environmental damage, but that is not to say that it prevented it altogether.

With falling groundwater levels in many places, the entry cost went up year by year for newcomers, who had to dig deeper for the water.²⁷⁰ Tanks could have recharged the groundwater levels through seepage, if only to a certain extent. Anjal Prakash of the organization SaciWATERs and Gopinath Reddy of CESS surmised that the opposite happened. In their opinion, neglect of tanks and local community initiatives for rainwater harvesting contributed to falling groundwater tables, affecting the depth of the bore-wells. Andhra Pradesh had advanced tank recharging systems, but these were left in a state of decay during the previous century.²⁷¹ In Aurepalle, I was shown a 50 year old map depicting the tanks and ponds on April 2 2013. Many of the water sources had dried up by the 1990s.

²⁶⁸ Field investigator in JC Agraharam, 2013.

²⁶⁹ Suchitra, «Groundwater levels plummet in Andhra Pradesh,» *Down to Earth*, January 16 2012.

²⁷⁰ Ravindra in an interview, 2013. Ratna Reddy 2004. Cf. Janakarajan 1993: 2-4.

²⁷¹ Prakash and Gopinath Reddy in interviews, 2013.

The lopsided emphasis on bore-wells and groundwater for irrigation implied a continuous deficit of water in some areas.²⁷² It was a sign that the reliance on groundwater approached its limit.²⁷³ Free electricity for agriculture was one single policy, but influenced numerous of other social welfare systems. For one thing, it may have disturbed the achievement of the Millennium Development Goals.²⁷⁴ A negative effect on public health, poverty and child mortality added to the list of past incidences and potential threats, as I explain below.

Groundwater depletion generally contributed to contamination of drinking water supplies in hard rock areas, through for instance concentration of nitrates and fluoride.²⁷⁵ Praveen Rao, director of the water technology centre in Hyderabad, explained that nutrients like nitrogen seeped down into the soil because of excessive watering, thus contaminating the groundwater.²⁷⁶



The village water tank in Aurepalle secured water for all the bore-wells after the rains in 2004. In 2013 it was dried up, which is why we were standing on what should have been the edge of the tank. Jin Fosli (left) and G D Nageswara Rao (right) Photo Amarender Reddy

²⁷² Revathi, Prakash, Gopinath Reddy Rahul Sen in interviews, 2013.

²⁷³ World Bank 2010: 3.

²⁷⁴ Ibid., p. 5.

²⁷⁵ Shah 2009: 6. Cherukuri cited the Groundwater Department of Andhra Pradesh in an interview in 2013 that nitrates was above limits in 33 percent of samples, electrical conductivity in 16 percent and fluoride in 12 percent.

²⁷⁶ Praveen Rao in an interview, 2013.

Bore-wells gradually became the dominant source of irrigation water for agriculture in Andhra Pradesh (apart from in some areas of higher rainfall and canal irrigation), much as wells replaced tanks in the 1980s.²⁷⁷ Y.S.R. Reddy could have secured a more sustainable groundwater extraction by focusing more on tanks and existing water sources as complimentary to bore-wells.²⁷⁸ Instead, over-extraction in non-command areas resulted in declining water levels, and increasing risks connected to drilling and extracting the water from bore-wells. To relieve the high risks connected with drilling and sustaining bore-wells, farmers could have shared or entered into joint ventures.²⁷⁹ It could prove difficult to share bore-wells during the few intense weeks when irrigation was needed. Yet, some evidence from Madirepalli village in Anantapur showed that farmers started co-operating after advice from RIDS.²⁸⁰ This lesson suggests that there was potential in community management of groundwater, but pilot-projects were not upscaled at the time of writing in 2014.

Conclusion

Following the death of chief minister Y.S.R. Reddy in 2009 the situation in agriculture worsened. Rainfall decreased again, with renewed drought from approximately 2011-12. Since electricity supplies also decreased, farmers shifted towards irrigated dry crops such as cotton and maize.

Farmers owning and cultivating land seemed to have their possibilities of profits «eaten» by rising prices of input and consumer goods. Faced with an unpredictable situation, staying vulnerable to market prices, the solution for some was migrating to cities leaving agriculture behind.

The democratization of bore-well agriculture, with an increased entry of marginal and small farmers, was a paradox since more bore-wells did not imply more water. Free electricity came at a high cost to bore-well farmers who exploited their resource beyond sustainable yields.

Agricultural distress continued in Andhra Pradesh, unresolved by the free electricity policy or other subsidies. The policy may, on the contrary, have increased the danger of removing the resource base of the rural poor depending on common property resources such as water.

²⁷⁷ Ravindra in an interview, 2013. Srinivasa Reddy and Ratna Reddy 2012: 29-30.

²⁷⁸ Revathi in in interview, 2013.

²⁷⁹ Fosli and Reddy 2013: 1.

²⁸⁰ This non-governmental organization worked to raise awareness on participatory management in the field. Rama Mohan 2012: 15.

5 The political context of free electricity

As we saw in the two previous chapters, the free electricity policy encouraged some farmers to invest in bore-wells. Gaining access to a bore-well did not necessarily imply that the farmer who invested got irrigation water for farming. In part, the success of a bore-well depended on whether or not it was connected to major water-bearing aquifers, the proximity of other bore-wells and the depth of the groundwater-levels. Electricity supplies affected the number of hours a day when irrigation water was available through bore-wells.

Rural populations of the semi-arid zones depended on water for their livelihoods and employment opportunities, but felt increasingly burdened by low and erratic rainfall. The drought and distress conditions in farming preceding 2004 were therefore central elements for Y.S.R. and Congress, who promised free electricity and vastly expanded irrigation in the state. By emphasizing rural development in Andhra Pradesh, they were able to emerge as a moral alternative to the leadership of Naidu and the Telugu Desam Party. Once in power, Y.S.R.'s regime made large-scale investments to improve irrigation in semi-arid zones of the state. The efforts seemed driven by fear that Congress would lose the next state Assembly election in 2009 unless they brought about quick and visible results.²⁸¹ Congress won the Assembly election in 2009, although their percentage of votes cast declined from 38.5 percent in the previous election to 36.53 percent.²⁸²

Following Y.S.R. Reddy's death in the fall the same year, electricity supplies decreased for a number of reasons, including political difficulties for the succeeding leaders. As we will see below, there were perceptions among respondents that Congress leaders after Y.S.R. were incapable of delivering services in the state. Dissatisfaction with the continued lack of water opened up for renewed agitations that Telangana should separate from the rest of Andhra Pradesh.

One particular political as well as administrative challenge in managing groundwater in Andhra Pradesh, as in the rest of India, was the large numbers of smallholders owning pump sets. Some, like the World Bank, argued that the transaction costs of enforcing groundwater pricing for millions of users would be too high for state governments.²⁸³

²⁸¹ Price 2010: 28-29.

²⁸² Suri 2004: 5496.

²⁸³ World Bank 2010: 80.

Against this Dinesh Kumar, who was director of the Institute for Resource Analysis and Policy, argued that Gujarat and West-Bengal successfully raised electricity tariffs and introduced metering of electricity consumption for farming. All new connections in Gujarat were metered electronically after 2002, and the meters were installed at heights inaccessible to farmers, who could not tamper with them.²⁸⁴ However, with estimates ranging between 200,000 and 600,000 shallow and deep tube wells, this state had only a fraction of Andhra Pradesh's up to 3 million bore-wells.²⁸⁵ Kumar had a good point when he argued that the political will and muscles to enforce metering was necessary.²⁸⁶ The main reason why electricity metering could be enforced in West-Bengal, however, was the absence of strong farmers' movements.²⁸⁷

Researchers and planners acknowledged the dual challenge in India posed by the political economy and limited government capacities. Some, most notably the World Bank, held a «Plan B» of community management as the most feasible alternative compared to high-level policy reform. Implementing collective targets would, on the other hand, run against general challenges of individual incentives to cheat.²⁸⁸

Enforcing already existing regulations was sometimes beyond the capacities of national and state authorities. One example is the difficulties authorities in Andhra Pradesh had enforcing the Andhra Pradesh Water, Land and Trees Act (APWALTA) of 2002. By passing the act, the government called for conserving and regulating water resources and the environment of the state. The spacing norms stipulated in the act were linked to official credit sources, but farmers could avoid the norms by obtaining credit at higher costs from unofficial sources.²⁸⁹

The wish to gain votes

The motivation of the Congress Party in implementing the free electricity policy in 2004 was mainly stated by respondents to gain votes, referred to by some as «vote banking».²⁹⁰

Traditionally, votes were cast along patronage ties in Andhra Pradesh, as in other states.

²⁸⁴ Kumar in an interview, 2013.

²⁸⁵ Ministry of Water Resources, Government of India 2007: Minor Irrigation Census (2006-2007). The census indicated 1'192'637 deep and shallow tubewells in Andhra Pradesh in 2007, while Yella Reddy estimated 3 million pumpsets in 2013. Mukherji, Shah and Verma 2010: 107. The authors suggested over 600,000 electric tube wells, which are suitable for pumping groundwater in sand from very deep levels, in Gujarat.

²⁸⁶ Kumar in an interview, 2013.

²⁸⁷ Mukherji, Shah and Verma 2010: 100.

²⁸⁸ World Bank 2010: 72.

²⁸⁹ Cf. for instance Kumar 2007.

²⁹⁰ Field investigator in Dokur, 2013. Similar argument by Sen in an interview in 2013 and the field investigator in JC Agraharam, 2013.

During Congress rule after Independence in 1947 powerful local landlords controlled votes through their control over people in areas that belonged to Andhra Pradesh after the state was formed in 1956.²⁹¹

Originally, the term vote bank was used as a reference to «interests» in the form of for instance credit or employment that could be acquired in return for votes.²⁹² This vertical system of mobilization depended on the expectations of delivery of some sort of services downward in the dependence chain. Services could be delivered from the Members of Parliament and Members of Legislative Assemblies to their constituencies and from landlords to their clients. Observers of the free electricity subsidy referred to the electoral promise of free electricity as a vote banking tactic. By that they probably meant that the traditional vote bank of farmers voted in favor of the Congress party, expecting delivery of improved irrigation services in return.

Y.S.R. tried to gain power at the expense of his main opponent, chief minister Naidu of the Telugu Desam Party, by promising free electricity and vastly expanded irrigation in the campaign preceding the elections in 2004. Above all, the Congress leadership wanted to unseat Naidu from his chief minister-post in the election because they thought the party would have a hard time recovering in the event that they lost to the Telugu Desam Party.²⁹³ The rapid urban development that took place during Naidu's leadership won international acclaim. On the other hand, his policies of economic reform made him vulnerable to opposition charges that he was a rich man's ruler who neglected agricultural development.²⁹⁴ Congress was able to emerge as a moral alternative to Naidu and the Telugu Desam Party by making hardship and distress in agriculture the major issues of their campaign.²⁹⁵ People in rural semi-arid zones perceived that droughts increasingly affected their livelihoods, even though Telangana and Rayalaseema were normally among the most drought-prone areas of India.²⁹⁶

Y.S.R. projected himself as a protector of debt-ridden farmers in the strained agricultural sector of the state.²⁹⁷ He challenged Naidu morally by undertaking a 1500-kilometre campaign journey in the summer heat, dressed as a farmer. In his campaign speeches and talks with people in the rural areas he particularly addressed water scarcity and

²⁹¹ See Robinson 1988: 8.

²⁹² Ibid., p. 45-46.

²⁹³ Ghildiyal, «Cynical YSR Reddy stoked Telangana fire to trip Chandrababu Naidu» in *The Times of India* July 31 2013.

²⁹⁴ Cf. Price 2011: 4.

²⁹⁵ Ibid., p. 5.

²⁹⁶ Ibid., p. 1.

²⁹⁷ Price 2011: 11.

drought in the semi-arid zones. Price has argued that Y.S.R.'s long and strenuous walk to meet villagers throughout the state was his strategy to spread accusations of Naidu ignoring the agrarian crisis.²⁹⁸ Y.S.R. pointed to specific unfinished irrigation projects where he made his speeches, promising an end to delays.²⁹⁹ In his widely publicized speeches, he wanted to persuade party workers and swing voters to support him. Swing voters are decisive in determining the results of elections in India, which are often won by tight margins, as we will see below.

Y.S.R.'s announcement and implementation of the free electricity policy might have contributed to securing the electoral victories of the Congress Party in 2004 and 2009. Irrigation water was a major campaign issue that gained much attention. We cannot, on the other hand, pin down to what extent promises of expanded irrigation construction and free electricity contributed to Y.S.R. Reddy's victories at the ballot box. There was no methodology to undertake an assessment weighting different motives for how votes were cast.³⁰⁰

One theory suggests that the tendency of voters to vote against the incumbent party could explain the tight victory of the Congress Party in 2004.³⁰¹ While the Congress alliance won 48.37 percent of all votes, the party itself gained 38.5 percent of votes cast, against 37.5 percent for TDP.³⁰² It was therefore no landslide victory in terms of votes cast, and even though the Congress won the majority of seats it did so at a margin of one percent of the votes.³⁰³ Because of the nature of the electoral «first past the post» system in India, this small lead was enough to secure Congress and its allies 226 seats in the State Assembly, compared to 49 seats for TDP and its ally, the Bharatiya Janata Party (BJP).³⁰⁴

The information from the test-villages 2013 indicates that Y.S.R. Reddy gained popularity as a person among rural voters for his welfare programs. If his personality as state leader decisively influenced voters' opinions, it could be one reason for the lack of appeal that succeeding leaders had after 2009, the year of the death of Y.S.R.

²⁹⁸ Price 2007, quoted in Price 2010: 303.

²⁹⁹ Price 2011: 18.

³⁰⁰ Suri 2004: 5496.

³⁰¹ See Price 2010: 8.

³⁰² Ibid. The author referred to K. C. Suri 2004.

³⁰³ K.C. Suri 2004: 5495.

³⁰⁴ Ibid.

The political aspects of free electricity

In Andhra Pradesh, as in Tamil Nadu, populist parties were often represented by a strongly charismatic leader portrayed as a heroic father-figure. One type of populism which often had a strong emphasis on the personality of the leader was paternalist populism. This type of appeal may explain why some of the farmers in the village JC Agraharam seemed to hold the opinion that Y.S.R. Reddy somehow personally provided them with nine hours of free electricity when he took office in 2004.³⁰⁵

Political leaders such as M.G. Ramachandran in Tamil Nadu, or Y.S.R. Reddy in Andhra Pradesh, were portrayed and partly perceived as protectors of the poor and vulnerable. Welfare policies may be interpreted as a result of the leader's good will by some, thus encouraging gratitude from the receivers.³⁰⁶ That the leaders were even ascribed with superhuman characteristics may explain their appeal to party workers and voters, and was probably the reason why informants from JC Agraharam credited the late Y.S.R. Reddy with the good rains during his period as Chief Minister.³⁰⁷

As we saw above, in the short run the Congress Party may have gained votes by promising and implementing policies such as free electricity for farming. For instance, the field investigator in JC Agraharam argued that the political impact in that village was the rise of the Congress Party and the fall of the Telugu Desam Party. Here, Y.S.R. Reddy was perceived as a great leader comparable to N.T. Rama Rao. The latter was a charismatic movie-star who founded the Telugu Desam Party in 1982-83, using welfare policies as «pro-peasant» measures in his campaigns.³⁰⁸ N.T.R. served as chief minister in Andhra Pradesh between 1983 and 1989. During his leadership he implemented the flat rate system in the place of metering, so that farmers would pay the same rate for electricity consumption throughout the day. Free electricity may look like a fundamental break with earlier policies, but in reality the first electricity subsidies for agriculture were implemented by N.T.R. during his first years of rule. Therefore, the free electricity policy was a way of changing or re-naming an already existing policy. When elected for the second time on populist welfare promises such as electricity subsidies for agriculture, N.T.R. pursued a reform line after 1994, during his short leadership before he was overthrown by Naidu of his own party. N.T. Rama

³⁰⁵ The field investigator in JC Agraharam stated that some farmers said that Y.S.R. Reddy gave 9 hours of free electricity.

³⁰⁶ Cf. Subramanian 1999: 75.

³⁰⁷ See Price 2011: 22.

The field investigator in JC Agraharam in 2013 described sentiments that Y.S.R brought rains by defeating Chandrababu Naidu of the Telugu Desam Party, 2013.

³⁰⁸ Birner, Gupta, Sharma 2011: 109.

Rao initiated electricity sector reform, which was quite in contrast with the anti-liberalization agenda the Telugu Desam Party promoted in the election campaign.³⁰⁹ The authors Birner, Gupta and Sharma quote Sumir Lal that politicians frequently gave populist promises before elections, but once in power they pursued reform agendas.³¹⁰

Why, then, did Y.S.R. go to great lengths, also in terms of budget money allocated to irrigation projects, on fulfilling the campaign promises of free electricity and other programs for relief to the agricultural sector? As we are well aware of by now, water was crucial for people's livelihoods in Andhra Pradesh. Congress politicians feared negative responses in the 2009-elections unless they could bring about quick and visible results in extending irrigation. Information Dusi Srinivas got from villagers in a Telangana village called «Balapalle» suggests that Y.S.R.'s efforts to deliver welfare services in the state did not go unrewarded.³¹¹ Villagers he talked to stated that Congress was reelected in Andhra Pradesh in 2009 because of his popularity and good performance as chief minister. Y.S.R. was recalled in a similar manner by farmers in JC Agraharam as a leader who was sensitive to people's needs and problems.³¹² The focus group members from women's Self Help Groups in Aurepalle perceived him as a good leader, with whom they associated the welfare programs that were implemented during his years of tenure.³¹³ But their loyalty and affection seems to have rested with Y.S.R. as a leader and not with the Congress Party as such.

The official implementation of welfare programs during his years of tenure strengthened his image as the leader of the Congress Party and the state, and he had a charisma that would make voters remember him fondly even four years after his death. Respondents argued that the government services in the state ceased functioning properly after Y.S.R. died, and that this had a damaging impact on the reputation of the Congress Party.³¹⁴ There was a perception among respondents in Aurepalle that the bad times, or a crisis, came in with the death of Y.S.R. Reddy.³¹⁵ Free electricity for farming was part of a generous package of welfare subsidies that was put in place during his years as chief minister.³¹⁶ By implementing the state subsidy program he went against the national policies

³⁰⁹ Birner, Gupta, Sharma 2011: 112.

³¹⁰ Lal 2006. Birner, Gupta, Sharma 2011: 17-18, 112.

³¹¹ Price, with Srinivas, forthcoming 2014: 18.

³¹² Field investigator in JC Agraharam, 2013.

³¹³ Focus group meeting with SHGs in Aurepalle on April 2 2013.

³¹⁴ As suggested by the field investigator in Dokur, 2013.

³¹⁵ Focus group meeting with SHGs, Aurepalle, April 2 2013.

³¹⁶ Sen in an interview, 2013.

of the Indian Congress Party, which also returned to power in 2004.³¹⁷ Congress politicians at the national level argued against free electricity, and in favor of cost recovery for government services. They turned down requests for financial support or extra electricity supplies to Andhra Pradesh.³¹⁸

Rahul Sen was a water expert and consultant for projects on management of groundwater and agricultural demand in Andhra Pradesh. He argued that the state subsidies generally affected other government spending, resulting in deteriorating public facilities.³¹⁹ Even though it seems likely that Y.S.R. would have faced the decreasing electricity supplies and economic difficulties of the state if he had lived, he was associated with the good supplies of electricity and water that lasted until his death. The person-orientation towards Y.S.R. may have been an advantage to the Congress Party as long as he was alive. While he was credited as the person who successfully managed to implement the free electricity policy, the three field investigators perceived the succeeding leaders of the state as incapable of supplying electricity.³²⁰ Two of the field investigators said farmers thought they benefitted from free electricity when the policy was implemented, but that the effect was nominal after the death of Y.S.R.³²¹ One of them said the policy was «for paper work» after the government change in 2010, and since the distribution of numerous subsidies had ceased to function, the benefits went solely to the politicians.³²²

Even though several respondents thought the decreasing electricity supplies and even the poor rainfall were caused by the death of the former chief minister, others emphasized the political difficulties that arose after he died. For instance, the field investigator in Pamidipadu considered that the Congress administration in the state was in a poor condition following 2009 because of political issues. Rahul Sen and the field investigator in Pamidipadu argued that the leadership crisis that emerged in the Congress Party of Andhra Pradesh following 2009 weakened the state administration.³²³ Charged with corruption, Dr. Y.S.R. Reddy's son, Jagan Mohan Reddy, broke with the Congress Party in 2010 to challenge them. During his own campaign before the 2014-elections he accused the party of trying to withdraw the

³¹⁷ Narasimha Reddy and Sen in interviews, 2013.

³¹⁸ Gopinath Reddy and Sen in interviews, 2013.

³¹⁹ Sen in an interview, 2013.

³²⁰ Field investigator in JC Agraharam, 2013; field investigator in Dokur, 2013, Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

³²¹ Cheepurupalli Padalu (field investigator in Pamidipadu), 2013; field investigator in JC Agraharam.

³²² Cheepurupalli Padalu (field investigator in Pamidipadu), 2013. The field investigator in JC Agraharam also reported in 2013 the electricity supplies to agriculture were reduced to 4-5 hours a day.

³²³ Gopinath Reddy in an interview, 2013, Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

electricity subsidies for agriculture, and promised to continue them like his father.³²⁴ The Congress Party may not have had the renewed factional battles and a breakaway faction if Dr. Y.S.R. Reddy had stayed alive. What is more, the reduction of the administrative capacities of the Congress Party in Andhra Pradesh after 2009 gave way to rising new support for a separate Telangana.³²⁵ The Telangana-movement gained momentum after the establishment of the separatist party Telangana Rashtra Samithi (TRS) already in 2001.³²⁶ Free electricity or the Jalayagnam irrigation package could have restrained sentiments that Telangana lagged behind the coastal Andhra region. Separatists argued that Telangana was put in the shadow by domination from the wealthier coastal Andhra region.³²⁷ Although much money was spent on free electricity and expanding irrigation construction, the results were meager. As we saw in previous chapter, the situation in agriculture worsened because of the decreasing access to water and electricity after 2009. Costs of input to agriculture other than agriculture generally rose, due to inflation and the removal of subsidies. A total sum amounting to 300, 000, 000, 000 Rupees was spent on projects to construct irrigation in Telangana by 2013.³²⁸ Yet completed projects supplied only 662, 000 acres of land out of totally 28, 377, 581 acres (114, 840 square kilometers) in this region. In Rayalaseema completed projects supplied merely 484, 000 acres out of totally 16,629, 944 acres (67, 299 square kilometers). In comparison, 970, 000 acres of totally 22,957,572 acres (92, 906 square kilometers) were supplied by new projects in the coastal Andhra region.

The political significance of irrigation water

The free electricity subsidy became a burden to the Congress Party, and two researchers expressed in 2013 that the government's hands were tied.³²⁹ The administration headed by Y.S.R. tried changing the subsidy with little success already in 2005 and announced that farmers who grew paddy during the Rabi crop season would not be granted free electricity. The conservation measure did not go through due to vehement resistance from farmers' organizations.³³⁰

³²⁴ Sen in an interview, 2013.

³²⁵ Price, with Srinivas, forthcoming 2014: 23.

³²⁶ See Pamela Price 2010: 15.

³²⁷ Price, with Srinivas, forthcoming 2014: 22.

³²⁸ «Telangana not neglected under Jalayagnam», *The Hindu*, February 9 2013.

³²⁹ Revathi in an interview, 201. Palanisami in an interview, 2013.

³³⁰ Birner, Gupta, Sharma 2011: 117. Quoting Kurmanath 2005. A targeting measure excluding some 5 percent of farmers from free electricity due to large size of holdings et cetera did go through.

In 2013 Kumar saw the government as merely holding on to power, having mastered the art and kept the policy lasting for nearly a decade.³³¹ Ten years after the announcement of free electricity there were still shortages of water and electricity for irrigation in the semi-arid areas, and the high hopes of some farmers went unfulfilled. Irrigation projects in the Jalayagnam package initiated by Y.S.R. were still not completed. The Comptroller and Auditor General (CAG) made several remarks in a 2012- report about irregularities in the contracting and planning of the projects.³³² The most important critique was for irregular payments for surveys during initial stages of the project, cost inflations amounting to Rs. 31, 290, 000, 000 (roughly USD 500, 000, 000), and lack of proper planning.³³³ A majority of the projects were started without necessary clearances, such as from Planning Commission. According to the report 31 lift irrigation projects would require 54.43 percent of the total electricity resources generated in the state.³³⁴

Because of the topographic limits, in reality extensive canal construction would be too costly with the high energy requirements of lift irrigation for upland rural communities in Telangana.³³⁵ Informants in «Balapalle», where the lack of irrigation water and jobs caused concern for villagers, had another interpretation of the delays to canal-construction in the region. In their opinion, the lack of development was caused by deliberate neglect from Seemandhra politicians.³³⁶ Y.S.R., an upper- caste landholder argued in 2013, had given high priority to development in his own constituency, while Telangana was left drought-ridden and without water. ICRISAT had taken him and other «Balapalle»-farmers on a study-trip to Kadapa District, where Y.S.R. 's constituency was, in Rayalaseema. Kadapa had been secured completed irrigation construction by the former Chief Minister during his years of tenure. After he saw this, the landholder shifted to the TRS from Congress in protest against what he perceived as lack of irrigation and progress in his own region. Growing dissatisfaction with the alleged lack of government investment in infrastructure in Telangana, such as canals, was an important reason behind the renewed sentiments that the region should separate from Andhra Pradesh.³³⁷

³³¹ Kumar and Sen in interviews, 2013.

³³² Shankar, «Jalayagnam, the mother of all frauds», *The Times of India*, April 16 2012. Cf. Government of Andhra Pradesh 2012: *Report of the Comptroller and Auditor General of India on Jalayagnam*.

³³³ «Jalayagnam cost goes up by Rs. 52, 116 cr: CAG», *The Hindu*, June 22 2013.

³³⁴ Government of Andhra Pradesh 2012: *Report of the Comptroller and Auditor General of India on Jalayagnam*: 20.

³³⁵ Price referring to water engineer Peter Mollinga in written communication, 2014. A similar argument was stated by Palanisami in an interview, 2013.

³³⁶ Price, with Srinivas, forthcoming 2014: 23.

³³⁷ «Strengthen Telangana movement: Kodandaram», *The Hindu*, June 4 2010.

Farmers and other supporters of a bifurcation between Telangana and the two other regions believed this would lead to an end to the delayed construction of canals from rivers running through the territory.³³⁸

The central Congress leadership in 2013 decided in favor of a bifurcation between Telangana and the two remaining regions of Andhra Pradesh. In March 2014 chief minister Kiran Kumar Reddy resigned in protest against the party's alleged attempts of gaining politically from the planned bifurcation of the state, with a new separate Telangana to be born in June 2014.³³⁹ Shortly after, India's president Pranab Mukherjee gave his approval of the Andhra Pradesh Reorganization Bill, popularly known as the Telangana Bill.³⁴⁰ The bill provided the legislative foundation for the bifurcation of the state. At the same time the president formally consented to imposing Central rule in the state after Kiran Kumar Reddy resigned as chief minister. According to Price and Srinivas, some voters thought the ultimate result of the poor performance of his administration would be the loss of the Congress Party in the 2014-elections.³⁴¹

People in all three regions of Andhra Pradesh focused on what the partition would mean for work and water.³⁴² Rural poor in Telangana thought they would gain better opportunities of work and education, and improved access to irrigation, after the division of the state.³⁴³ The expected changes caused concern and resentment among the populations of the coastal Andhra region and Rayalaseema. They would «lose» Hyderabad to Telangana in the partition. Rural poor in the remaining regions of Andhra Pradesh feared that the consequence would be a drastic reduction of their future employment opportunities. Rising conflicts over water was a matter of great concern for them. Beemavaruppu Subba Reddy, a farmer in the coastal Andhra region was quoted by Sainath in 2013 as thinking that losing water to Telangana would be the last loss in a series of blows since the state government ceased functioning.³⁴⁴ He thought the centrally imposed decision of state partition would lead to farmer suicides in the coastal Andhra region and Rayalaseema.

³³⁸ Price in written communication, 2014.

³³⁹ «Talk of President's rule as Kiran quits», *The Hindu*, February 20 2014.

³⁴⁰ See for instance «Telangana Bill, Central Rule receives President's nod», *The Hindu*, March 1 2014.

³⁴¹ Price, with Srinivas, forthcoming 2014: 23. The election had not yet taken place at the time of writing.

³⁴² Sainath, «Can we send them to America?», *The Hindu*, August 21 2013.

³⁴³ Sainath, «Their hands will look different», *The Hindu*, August 13 2013.

³⁴⁴ Sainath, «Can we send them to America?», *The Hindu*, August 21 2013.

Conclusion

The Congress Party and Y.S.R. Reddy used free electricity for farming as a campaign tool to gain votes and promote themselves as «pro-farmer» before the election in 2004. The welfare programs Y.S.R. implemented during his years as chief minister from 2004 until 2009 strengthened his image as the leader of the state and Congress Party. He went against the national policies of the Indian Congress Party by putting the subsidy programs in place. They turned down requests for financial assistance or extra electricity to cover the free electricity subsidy. Y.S.R.'s administration went to great lengths to fulfill the campaign promises of extending irrigation in the state. They succeeded at being re-elected in 2009, although the vast sums poured into irrigation-projects did not pay off.

Y.S.R. might have faced the mounting economic problems caused by the welfare programs, and the shortages of water and electricity in Andhra Pradesh, if he had lived. After his death the Congress Party was left in a leadership crisis that was unresolved in 2014. Internal political problems weakened the new administration's performance after 2010. Dissatisfaction with the alleged lack of funding for irrigation projects in Telangana opened up for renewed agitations that Telangana should separate from Andhra Pradesh. Lacking results from free electricity and irrigation projects contributed to strong and successful sentiments in favor of a separate Telangana. The rural poor in Telangana anticipated the planned partition, thinking Telangana would get improved access to work and water. In the two remaining regions, rural people feared the outcome, as they thought the separation of the state would come to mean loss of water and employment opportunities.

6 Conclusion

Indian policies to keep agriculture sustainable are fraught with dilemmas, as we saw in this case-study of effects of free electricity for farming in Andhra Pradesh. Lifting rural populations out of poverty remains an important, albeit challenging task, for politicians in the world's largest democracy. They will need to construct policies adapting to the new context of climate change.

As we saw in the introductory chapter, a specific challenge arises when groundwater supply moves from an issue of sustainability over time, to an urgent crisis because of over-extraction. The task of conserving natural resources such as groundwater would seem to conflict with short-term needs of farmers to save next season's harvest.

In rural Andhra Pradesh, more than two thirds of people survive by agriculture.³⁴⁵ Farming populations in semi-arid zones, amounting to at least 65 percent of farmers in the state, increasingly feel burdened by erratic rainfall and scarcity of water.³⁴⁶ Politicians needing votes to win elections may look for quick returns through promises such as more irrigation and free electricity. Attempts at implementing and enforcing groundwater regulations, on the other hand, proved difficult. Politicians were generally not able to implement direct regulation of groundwater use, but could only regulate subsidies and electricity pricing.³⁴⁷

Resistance on the ground prevented the spacing norms in APWALTA of 2002 from being implemented.³⁴⁸ If fully enforced, the act could have limited well-competition between too closely spaced bore-wells. Farmers violated government prescriptions by installing new bore-wells next to successful ones. Further, the attempts of Y.S.R.'s administration of limiting the damaging impact of over-extraction by fining farmers who grew paddy during the dry Rabi (spring) season failed due to strong resistance by farmers' lobbies.

Farming populations had to adapt to erratic rainfall in areas of recurrent droughts, as the farmers in the four test-villages did. Their unstable situation was a good example of how changing climate may affect people in semi-arid zones of the world. Developing policies

³⁴⁵ Government of Andhra Pradesh, Department of Agriculture:
<http://agri.ap.nic.in/Evolution.htm>

³⁴⁶ Rough estimates based on farm- and non-farm employment in Rayalaseema and Telangana found in Amarender Reddy and MCS Bantilan 2011: 128. Cf. Pingle 2011: 1. Excerpts from Census Organization of India 2011: *Population Census 2011*. «How Telangana compares with Andhra Pradesh's other regions», *Business Standard*, August 25 2011.

³⁴⁷ Cf. World Bank 2010: 79-81.

³⁴⁸ The act was developed for the conservation of land, water and trees.

responding to climate change will become even more pressing for politicians in the future. Researchers expect that climate change will lead to reduced access to freshwater in several countries.³⁴⁹ Some groups may lose, while others gain from the new situation. Rising temperatures are going to result in loss of livelihoods in some places, affecting marginalized groups more than others.³⁵⁰ The water-scarcity that follows is a threat to the world's food security, in the future as now.

A tragedy of the commons

In his election campaign before the 2004-elections, Y.S.R. charged chief minister Naidu with neglecting farmers' distress in the state. By giving the promise of free electricity, and of improving irrigation, Y.S.R. projected himself as a protector of a strained, drought-ridden agricultural sector. He promised to finish irrigation projects in Andhra Pradesh within three years, if Congress was voted to power in the state.³⁵¹ By focusing on irrigation he rightly perceived the importance of water to people in the semi-arid zones. Once elected, his regime made huge efforts to fulfill their campaign promises, and quickly implemented free electricity for agriculture.

Farmers in the test-villages were encouraged by the policy to drill more wells, and as we saw, marginal, small and medium farmers tried entering bore-well agriculture. Thus, free electricity aggravated an already existing trend since the 1980s of bore-well proliferation in Andhra Pradesh. As argued, however, more bore-wells do not imply more water, and there is an optimal number of bore-wells in a given village. Competitive drilling contributed to falling groundwater-levels and water depletion in the test-villages. The development was consistent with a national trend of rapid bore-well proliferation resulting in a lowering of the groundwater-table. The real costs of pumping rose as the groundwater-levels fell, because pumping deeper requires more energy. A tragedy of the commons took place in non-command areas among farmers depending on bore-wells. Small and marginal farmers generally had limited access to formal credit, and had to resort to private loans at high interest rates. They were unlikely to sustain prolonged competition.

³⁴⁹ Norwegian Environment Agency 2014. *Alvorlige virkninger av klimaendringer, men risikoen kan reduseres*, factsheet based on *Intergovernmental Panel on Climate Change (IPCC) 2014: Fifth Assessment Report: Climate Change 2013 (AR5), part II*.

³⁵⁰ Norwegian Environment Agency 2014 / IPCC AR5.

³⁵¹ Price 2011: 18.

A gamble at high risk

Farmers who gained access to irrigation through bore-wells could start growing commercial crops, like for instance farmers in JC Agraharam and Pamidipadu. Cotton, sunflower, chili, maize and chickpea are examples of major commercial crops in the two villages. As a result of their market entry, farmers in JC Agraharam could expand their diets. The good rainfall after 2004-05 and lowered costs of agricultural input were advantages to farmers during the first years of free electricity. The field investigator in Pamidipadu argued that farmers' economic well-being improved during the first five years of free electricity.³⁵² Production increased, and market prices for farm products were high. Not least, free electricity was delivered for seven hours a day. Similarly, there was an improvement in the household income and economic well-being in Aurepalle during the same period.³⁵³ Successful drilling of bore-wells and increased cultivation of commercial crops were two of the most important reasons for the good trend during these years.

As argued in the thesis, however, a few years of growth in agriculture conditioned by good rains was not the same as a comprehensive transformation of rural living-conditions. Farmers remained vulnerable to erratic rainfall and fluctuating market prices for their products, and farming was a gamble at high risk for many of them. After the death of Y.S.R. Reddy crop loans and agricultural subsidies were reduced, or ceased to be granted.³⁵⁴ A rural inflation rate of around 10 percent reduced the purchasing rate of farmers, even though there was an average median growth of 7.2 percent per person in real household income in rural areas of India.³⁵⁵

All farmers were affected by decreasing supplies of electricity after Y.S.R.'s death in 2009. Rainfall gradually worsened after this year, and farmers in the test-villages changed their cropping patterns to for instance cotton, which requires less irrigation, as a survival strategy. Drought had a negative effect on electricity supplies in India, as elsewhere in South-Asia. The electricity sector was strained by the financial burden the government of Andhra Pradesh created by only partially paying the subsidy for free electricity. As the World Bank wrote in the 2010-report *Deep Wells and Prudence*, electricity subsidies for farming is the number one cause of bankruptcy for Indian State Electricity Boards. Despite the vast sums

³⁵² Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

³⁵³ Reddy, Ramana; Mohan Rao, Kiresur and Bantilan 2011: 3.

³⁵⁴ Field investigator in JC Agraharam, 2013, Cheepurupalli Padalu (field investigator in Pamidipadu), 2013.

³⁵⁵ Amaresh Dubey and Reeve Vanneman 2014. «An inclusive growth policy», *The Hindu*, April 5 2014.

that went into free electricity and development of irrigation in Andhra Pradesh, water shortages remained widespread in semi-arid zones of the state.

Conflicts over water

The ambitious Jalayagnam package had not resulted in major improvement of irrigation throughout the state in 2013. Irregularities in the contracting and planning of the projects received harsh critique from the Comptroller and Auditor General (CAG) in 2012. Telangana-farmers interpreted delays in canal construction as deliberate neglect from Seemandhra politicians. Regional disparities in terms of water, employment opportunities and agricultural production and growth persisted in Andhra Pradesh. People in all three regions of the state were affected by the worsening performance of Congress following Y.S.R.'s death in 2009, but the lack of visible progress contributed to renewed sentiments in favor of a separate Telangana. The planned bifurcation of the state created anticipation among the region's farmers that they would gain improved access to water and work. Rural populations in the two remaining regions resented the partition, and feared that loss of water to Telangana would spark off conflicts. Their concerns were in line with general findings from the Intergovernmental Panel on Climate Change. The panel expects that climate change will contribute to an increased level of conflicts on a global level. Effects of a changing climate will aggravate other sources of conflict, such as poverty and economic decline.³⁵⁶

Creating sustainable agriculture

The state authorities in Andhra Pradesh were confronted with the need to create sustainable agriculture. Free electricity was one part of a number of welfare subsidies put in place during Y.S.R.'s years of rule. Contrary to alleviating poverty, free electricity may have disturbed the general achievement of the Millennium Goals, particularly the goal of ensuring environmental sustainability. Excessive watering contributed to a worsening quality of groundwater in some areas, negatively affecting public health.

Bore-wells replaced tanks as the dominant irrigation source in Telangana and Rayalaseema. Y.S.R. could have secured a more sustainable extraction by focusing on complimentary water sources such as surface water and tanks. Watershed development can result in recharged groundwater levels, so that tanks can fill up again if there is sufficient and predictable rain. Instead, the declining groundwater levels due to over-extraction led to increased risks for farmers. Landless in the rural semi-arid zones had survived on common

³⁵⁶ Norwegian Environment Agency 2014.

property resources, such as water. They were negatively affected by the de facto privatization of groundwater that followed bore-well extension.

Rampant migration from rural areas of Andhra Pradesh, such as from Dokur and Pamidipadu, had some advantages. As we saw in the thesis, farmers received remittances from their city-dwelling relatives. In the long run migration from villages may threaten food security, unless politicians and policy-makers succeed in making agriculture sustainable.

Balancing on a tightrope

As we saw above, Indian authorities have a number of considerations partly conflicting with each other in the task of making agriculture sustainable: They have to balance supplies and allocations to water and electricity between different groups, such as urban industry and rural agriculture. State Electricity Boards relied on healthy state finances to afford maintenance and efficient running, but were pushed into debt by politicians who would not, or could not, cover subsidies over state budgets.

Following 2004 electricity demand generally exceeded what the state could supply in Andhra Pradesh. The problem was not limited to this state, or to India, but remained a problem in other South-Asian countries, such as Nepal. Since electricity was not metered, agricultural consumption could be overstated by the State Electricity Board. As a result other users, including State Electricity Boards, may have been benefactors of what was reported as electricity to farming.

Regional inequalities in Andhra Pradesh provided a strong ethical argument in favor of implementing free electricity. Supporters expected that the subsidy could secure some private irrigation for farmers in non-command areas of the semi-arid regions. Canal water, as we saw, had a limited scope. The government could in some cases have few other options besides improving already existing canals. Enhancing canal extension is challenging because of the topography, in the opinion of principal researcher K. Palanisami at the International Water Management Institute.³⁵⁷ The free electricity policy contributed to unsustainable over-extraction of water. The negative consequences on the environment disproportionately affected the poor, as water diminished. Therefore, objectives of reducing groundwater use partly conflicted with the aim to sustain livelihoods in rural semi-arid zones.³⁵⁸ Political attempts of conserving measures such as supply regulation of electricity met strong resistance from farmers' lobbies.

³⁵⁷ Palanisami in an interview, 2013.

³⁵⁸ Cf. Shah 2009.

Climate change

Effects from climate change may be difficult to track, but are possibly already visible in semi-arid zones, such as in Andhra Pradesh. There, falling groundwater levels have recently aggravated the effect of drought and erratic rainfall. Farming populations resorted to the traditional response to drought by shifting their cropping pattern towards rain-fed and irrigated dry crops, like pulses, maize and cotton. Maximizing production may not be an option in villages of semi-arid zones, where farmers will have to find an optimal yield in order not to waste input such as water, fertilizer and seeds.

We know that climate change will affect the marginalized disproportionately; therefore it is crucial to develop policies that include the rural poor. If policy-makers aim to create sustainable agriculture, one option is to promote and reward cropping patterns that are suitable under dry conditions. Pulses, for instance, are suitable for farming in semi-arid zones. They are cultivated at low-risk, are nutritious and a source of proteins, although they give much lower yields per acre than for instance cotton. Low crop yields cause problems for farmers, who have high input costs and often resort to credit for pesticides and seeds. Subsidies for agricultural inputs could mitigate the high costs farmers face, and were granted under Y.S.R.'s administration. In 2013, however, the field investigator in JC Agraharam said that farmers no longer received such subsidies. As we saw, the state finances were strained by the numerous welfare programs and subsidies that were put in place during Y.S.R.'s years of rule. For instance, the government struggled to keep up electricity supplies.

Crop insurance and minimum support prices (MSPs) for selected agricultural products could contribute to lower water-use by affecting farmers' cropping patterns.³⁵⁹ MSPs are already put in place for chickpeas and cotton, amongst other crops of low water-intensity.³⁶⁰ They may not be reaching the farmers, however, as The Centre for the Study of Developing Societies showed in a recent study that only a few were aware of the existence of minimum support prices in India.³⁶¹

Access to water was skewed before 2004, and the relative neglect of common water sources and privatization of groundwater made the situation even worse in non-command areas of the semi-arid zones. One solution could be providing more work hours for rural poor in maintenance of watersheds. The focus group meeting in Aurepalle on April 2 2013

³⁵⁹ Sinha, Bharat Sharma and Scott 2006: 242.

³⁶⁰ Government of India (GOI), Ministry of Agriculture 2012. *Agricultural Statistics at a Glance, 2012*: Table 8.1 Minimum Support Prices of various Agricultural Commodities (According to Crop Year).

³⁶¹ «Most farmers aware of MGNREGA scheme, but not MSP: Study», *The Economic Times*, March 11 2014.

suspected that money allocated to watersheds was lost due to corruption. To counter the challenge of corruption, the authorities will have to enhance transparency, for instance by publishing accounts.

Unless watersheds are regularly maintained, the work will be lost. In Dokur, for instance, the check-dams and other constructions collapsed within one year after they were built.³⁶² Securing a stable and just access to water is challenging, and will require a high level of co-operation and concerted efforts. Developing a policy, or building a watershed, can be done in a matter of months. Keeping a just distribution of water in place requires continuous co-ordination and concerted efforts. It is not only a matter of allocating money, but of building trust and platforms for co-operation between national, regional and local authorities, and users on the ground.

As we have seen, government institutions had limited capacities to enforce groundwater regulation. The sheer sum of 3 million private bore-wells spread over vast distances provided a challenge. Responsibility for overseeing policies related to governing water was fragmented between numerous institutions. Developing and implementing policies and laws for direct groundwater management were generally not regarded as feasible options. Therefore, indirect approaches of a technocratic bias, such as supply-regulation of electricity, have dominated government attempts at limiting groundwater use.³⁶³ The key issues related to agricultural development and water distribution are, however, political, and should be addressed by politicians. Politicians will need visions in order to create more sustainable agriculture. Expectations of more erratic rainfall in the future should lead them to develop more sustainable agricultural policies. Promoting suitable crops for cultivation under dry conditions would not conflict with politicians' need to gain popular support and votes. Indirectly, it could lead to less use of water. Under the current regime, securing a more predictable supply of electricity through time-tables could bring down inefficient water-use.

In the past, politicians have encouraged cultivation of water-intensive crops, such as paddy, through agricultural policies such as free electricity.³⁶⁴ In the future, politicians must take on the challenge of breaking the energy-groundwater nexus and addressing over-extraction if they want to sustain livelihoods in agriculture and keep food security.

³⁶² Field investigator in Dokur, 2013.

³⁶³ Sinha, Bharat Sharma and Scott 2006: 243.

³⁶⁴ *Ibid.*, p. 244.

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