Using Louis-Ostrom Comprehensive Capacity Assessment to Analyze Domestic Water Infrastructure in Nalgonda District, Andhra Pradesh, India.

A Thesis

Presented to the faculty of the School of Engineering and Applied Science University of Virginia

in partial fulfillment

of the requirements for the degree

Master of Science

by

Siddhartha Pailla

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APPROVAL SHEET

The thesis

is submitted in partial fulfillment of the requirements

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Abstract

Access to safe domestic water supply remains a challenge in much of Rural India. The Nalgonda District in Andhra Pradesh, India has been addressing this challenge through provision of centralized water supply services (CPWSS), groundwater pumps and overhead reservoirs (PWSS), and rainwater harvesting schemes (PWS). Although Indian federal law decrees participation of the Panchayati Raj in water-related issues, there is currently no clear process for assessing and communicating local situation to District and State-level institutional leaders. As such, this limited knowledge has led decision-makers to select "shotgun"-type (generally targeted, high-cost, high-impact) solutions; specifically in Nalgonda, large-scale centralized water systems such as the Alimenti Madhava Reddy Water Irrigation Project. This approach may be appropriate for high-capacity communities; however, previous research by Hardin, Louis, Ostrom, Maton, Rogers, and other developing systems-focused researchers indicates that community-specific assessment and policy increases communal ownership and system realization.

This research introduces a participatory, comprehensive, and intra-institutional framework for considering domestic water-related technological solutions. The author first conducts a general feasibility study for Nalgonda's domestic water supply in meeting WHO's 40 lpcd requirement. Then, the author creates a hybrid framework that combines localized Capacity Factors Analysis (CFA) methodology and larger governance-specific Ostrom's framework for assessing socio-ecological systems (SESs). The Louis-Ostrom Comprehensive Capacity Assessment (LOCCA) tool is then used to consider the three major technological solutions currently being used in Nalgonda: CPWSS, PWSS, and RHS. Results indicate that CPWSS may be appropriate for a sub-section of the District, but RHS have a better likelihood of success in more rural communities of Nalgonda.

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Table of Contents

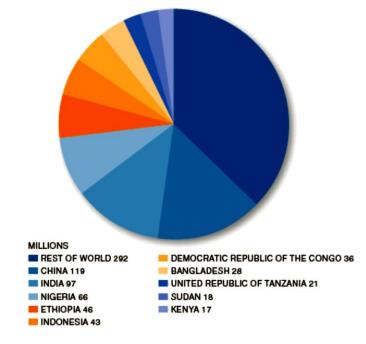
Chapte	er 1:	Research Background and Problem Definition	2
	1.1	Community Assessment for Water-related Technology Solutions as Risk Assessment of Water Scarcity	3
	1.2	Water Issues in Nalgonda	7
	1.3	Water and Sanitation as Interrelated Issues	14
	1.4	Problem Definition – Improving Assessment for More Informed Decisions	15
Chapte	er 2:	Research Relevance, Motivation, and Goal	19
	2.1	Water Scarcity around the World	19
	2.2	Background on Nalgonda and its Current Water Condition	22
	2.2.1	Fluoride in Nalgonda	26
,	2.2.2	Water distribution network in Nalgonda	28
Chapte		Water distribution network in Nalgonda Review of Risk and Capacity Assessment Methodologies	28 30
Chapte			
Chapte	er 3:	Review of Risk and Capacity Assessment Methodologies	30
Chapte	er 3: 3.1 3.2	Review of Risk and Capacity Assessment Methodologies General Frameworks for Risk and Capacity Assessment Ostrom's Framework for Social-Ecological System	30 30
Chapte	er 3: 3.1 3.2	Review of Risk and Capacity Assessment Methodologies General Frameworks for Risk and Capacity Assessment Ostrom's Framework for Social-Ecological System Assessment	30 30 32
Chapte	er 3: 3.1 3.2 3.3 3.4	Review of Risk and Capacity Assessment Methodologies General Frameworks for Risk and Capacity Assessment Ostrom's Framework for Social-Ecological System Assessment Louis' Capacity Factors Analysis Methodology Strengths and Weaknesses of Louis' CFA and Ostrom's	 30 30 32 36
Chapte	er 3: 3.1 3.2 3.3 3.4	Review of Risk and Capacity Assessment Methodologies General Frameworks for Risk and Capacity Assessment Ostrom's Framework for Social-Ecological System Assessment Louis' Capacity Factors Analysis Methodology Strengths and Weaknesses of Louis' CFA and Ostrom's SES Assessment Frameworks	 30 30 32 36 39

4.3	4.3 Research Activities	
Chapter 5:	Louis-Ostrom Comprehensive Capacity Assessment	47
5.1	Requirements for the Modified-CFA at the Habitation	
	Level	51
5.1.1	Service capacity factor	52
5.1.2	Institutional capacity factor	53
5.1.3	Human Resources capacity factor	54
5.1.4	Technical capacity factor	55
5.1.5	Economic and Financial capacity factor	57
5.1.6	Energy capacity factor	59
5.1.7	Environmental and Ecological capacity factor	60
5.1.8	Social-Cultural capacity factor	62
5.2	Technology Capacity Level and Matching Rule	64
5.3	Aggregate Community Capacity Assessment	66
5.4	Policy Capacity Grade and Matching Communities with Policies	68
5.5	Ranking Strategies for Technologies and Policies	70
5.6	Implementation Timeline of Chosen Alternatives	70
Chapter 6:	Technology and Policy Alternative Capacity Assessment	71
6.1	Technology Alternative Capacity Level Assessment	71
6.1.1	Comprehensive protected water supply scheme TCL	72
6.1.2	Protected water supply scheme TCL	74
6.1.3	Rainwater harvesting scheme TCL	75
6.2	Policy Capacity Grade	78
6.2.1	Comprehensive protected water supply scheme PCG	81
6.2.2	Proliferation of protected water supply schemes PCG	82
6.2.3	Proliferation of rainwater harvesting schemes PCG	83
Chapter 7:	Results of Capacity Assessment in Nalgonda	84

Chapter 7:	Results of Capacity Assessment in Nalgonda	

7.1	Capacity Assessment by Mandal	87
7.1.1	Bhongir Mandal	87
7.1.2	Alair Mandal	89
7.1.3	Yadagirigutta Mandal	91
7.1.4	Voligonda Mandal	93
7.1.5	Mothkur Mandal	96
7.1.6	Choutuppal Mandal	98
7.1.7	Deverkonda Mandal	99
7.1.8	Huzurnagar Mandal	101
7.1.9	Marriguda Mandal	103
7.1.10	Miryalaguda Mandal	105
7.1.11	Nakrekal Mandal	109
7.1.12	Nalgonda Mandal	111
7.1.13	P. A. Pally Mandal	113
7.1.14	Narayanpur Mandal	116
7.1.15	Suryapet Mandal	118
7.1.16	Chandempet Mandal	121
7.2	Summary of Capacity Assessment of Nalgonda	124
Chapter 8:	Conclusion	126
Chapter 9:	Bibliography	128
Appendix I:	Community Capacity Assessment of Nalgonda with RWS	134
Appendix II:	Appendix II: Technology Capacity Level Scores	
Appendix III	Policy Capacity Grade Scores	138
Appendix IV:	Community Capacity Assessments	141
Appendix V:	Aggregate Community Capacity Grades	174

Chapter 1: Research Background and Problem Definition



Ten countries are home to two thirds of the global population without an improved drinking water source

Figure 1: According the Joint Monitoring Programme (JMP) report from 2012, there are still 783 million people in the world without access to approved drinking water supply. Moreover, citizens of India and China represent over a quarter of those without access (JMP 2012).

At the turn of the millennium, leaders of the United Nations pledged to better the world and collaborated to create the Millennium Development Goals (MDG). Among the agreed upon objectives of addressing problems such as poverty, hunger, and equity, Target C of Goal 7 of the MDGs focused on ensuring environmental sustainability with an objective of "halving, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation" (United Nations Millennium Development Goals Report, 2009). According to the United Nations' Children Fund (UNICEF) and World Health Organization (WHO)'s Joint Monitoring Programme (JMP), approximately 783 million people in the world do not have access to improved water supply. Geographically, nearly one in three people in every continent live in an

area that faces immediate and predicted water scarcity, which may be defined generally as the inability for a region's water supply to meet its demands. Even a region with vast supply of water may still fall vulnerable to poor water quality, water and wastewater management, or too much demand.

1.1 Community Assessment for Water-related Technology Solutions as Risk Assessment of Water Scarcity

Alexander Müller (2006) defines water scarcity as "the point in space, or the moment in time, at which the aggregated impact of all users impinges on the supply or quality of water, under the prevailing institutional arrangements, to the extent that the total demand by all sectors, including the environment, cannot be fully satisfied." When considering Müller's definition, one can expect that decision-makers consider the key relevant factors, including – supply, demand, institutional arrangements, quality, climate change, and ecology. However, what is not explicitly stated is the aggregated effects of these factors. For the purpose of this paper, this aggregation is considered as not just the sum of the impact by sets of users, but also impacts of interactions between subsystems. It is thus imperative that institutional leaders consider the aggregated impact in order to mitigate the risk of the event of water scarcity. Otherwise, the consequences associated with water scarcity may be significantly underestimated leading to inappropriate policies to manage their associated risks.

In that sense, one can consider that holistic assessment of communities' capabilities to adopt technological policy or solutions as risk assessment of the event of water scarcity. Several methodologies have been proposed to lower, or at least understand, the risk of failure of water-related systems, and most of these are proactive.

For example, WHO and UNICEF use the Rapid Assessment of Drinking Water Quality, which focuses specifically on source and quality, rather than quantity. The World Bank (WB) uses Demand Responsive Approach (DRA) and Methodology for Participatory Assessment (MPA). These approaches consider water demands and equip regional governments with the resources to provide appropriate supply, accounting for the regional governments' preference and WB's recommendation. Yet another evaluative methodology is the Social-Ecological System Assessment, which focuses on qualitative measurements of multiple different indicators of different subsystems in a large, complex social-ecological system (SES). Finally, Capacity Factors Analysis is another methodology that is used to match different technological solutions with the localized community's particular capabilities.

Given the availability of a variety of risk assessment and appropriate technology recommendation tools, where does the need arise? Specifically, there are three issues. First, the assessments are not comprehensive enough, as discussed earlier with regards to Müller's definition of water scarcity. Second, the assessment tools are not participatory of relevant stakeholders, as shall be discussed here. And third, the assessment tools are not designed for transfer of knowledge from one institutional level to the other; this shall also be discussed later.

What does participatory mean? While tools exist for assessment and analysis of water-related systems, they exist in a primarily consultative capacity; that is, they are framed such that a third-party meets the relevant stakeholders in order to have an idea of what a community's demand and capacity may be, and then that party recommends a solution with a matching supply. While elements of these methodologies do give some

agency to any particular community, Maton (2008) suggests that the continuous and iterative participation of stakeholders throughout the development process better serves to empower and retain ownership of that community and its development. Almost all studies focused on building in developing communities signify ownership and agency as correlative indicators of a project's success or failure (Maton and Salem, 1995). As such, any design or policy methodology should try to focus on including the collective stakeholder groups throughout the process.

Thirdly, the assessment should also account for, or at the least allow for, transferability of knowledge between different institutional levels. This knowledge must transcend the typical demographic, geographic, geological, and assets data, all of which are already recorded and reported each year in the district Statistics Handbook. In order to understand why this transferability is important, one must first understand the institutional structure in the state of Andhra Pradesh (it is slightly different from other states in India). The rural governance works under the Panchayati Raj system, which has three institutional levels. At the bottom is the Gram Panchayat, which leads a small group (typically 1-4) villages or habitations. The middle level is the Mandal Praja Parishad, which leads a set (typically 10-25) of Gram Panchayats. The top level is the Zilla Parishad, which oversees all Mandals in the district. The institutional structure is displayed in the figure below.

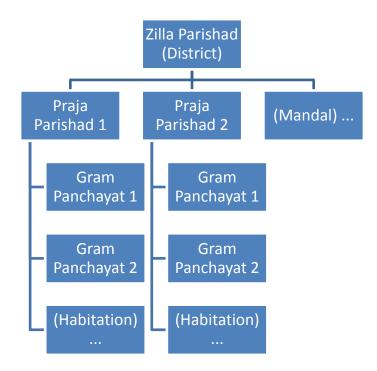


Figure 2: Panchayati Raj governance structure in Nalgonda.

Nalgonda has 3 million citizens across 59 mandals and 3,357 habitations. In an area that already faces severe physical water scarcity, the provision of 40 lpcd to over 3 million citizens becomes a difficult task. Rather than working across institutional levels or across different institutional groups to form well-informed alternatives, the current Nalgonda governance divides the goal of water supply onto the three institutional levels. **Zilla parishad**, through its **Department of Rural Water Supply (RWS) Services**, helps to design and contract out centralized water supply systems dubbed as Comprehensive Protected Water Supply (CPWS). RWS Services also designs and contracts out groundwater pump and reservoir systems dubbed Protected Water Supply (PWS) construction for individual villages. **Mandal praja parishad** oversees the maintenance of hand pumps in the respective mandal. The individual gram panchayats operate and maintain their PWS after construction, if they have one.

Two things happen during this mechanical division of labor. First, there is very little information flow, outside of the items aforementioned, between the institutional levels. Venkataswarulu, an Executive Engineer in RWS in charge of mandals in the north half of Nalgonda, notes that the department is typically only acutely aware of current construction projects and the CPWS systems. Otherwise, the status, much less the proper operation or maintenance, of PWS services or hand pumps, mechanisms that deliver water to over two-thirds of the district, is recorded bi-annually unless there is a complaint (2010). Second, decision-makers cannot make informed decision without this upwards information flow. Much like how the brain needs heat receptors to process whether a certain substance is hot or not and act accordingly, so do the different governances need equivalent receptors to assess capacity and demand to act properly. If a certain community is unable to maintain a PWS, the chances are lower that it will be able to operate and maintain a segment of CPWS.

It is clear that a more comprehensive, participatory, and intra-institutional risk assessment strategy be employed for effective management of domestic water supply services. Before proposing such a strategy, Nalgonda's current situation will be explored.

1.2 Water Issues in Nalgonda

Nalgonda is a rural district that lies east of Hyderabad, the capital city of the state of Andhra Pradesh, India. It is home to over 3 million Indians, as of 2010. Nalgonda has a range of water issues that can be broken up into three categories: water quantity, water quality, and management of water infrastructure. The district faces a seasonal water scarcity crisis; nearly two-thirds of the rainfall occurs during the monsoon season. This often leads to seasonal rivers and causes minimal reliance on surface water as a steady source for drinking water supply. Most people in the area rely on groundwater as means of drinking water supply and surface water for agricultural purposes.

Furthermore, the district's geological features of limestone and clay sediment inhibit percolation of rain into the groundwater aquifers. With the innovations in groundwater technology over the past 50 years in South India, the digging of bore wells has become economical; as a result, dependence on groundwater for both irrigational and domestic uses has risen sharply. Unfortunately, this rise in demand as demonstrated by nearly 110,000 dug wells (M.K. Rafiuddin 2007) has continually exceeded the groundwater regeneration rate, and thus is beholden to sharp drops in groundwater levels across arid regions of South India including the district of Nalgonda. Of the 59 mandals, only 27 were qualified as "safe" for development; that is, that mandal has not exceeded drawing more than 70% of its net available resource. 25 mandals were qualified as "semicritical" (70-90% use), 4 mandals were qualified as "critical" (90-100% use), and 3 mandals were qualified as over-exploited (>100%). Furthermore, the State Ground Water Authority issued notices for restricted development to 367 villages in 2005. Rafiuddin comments in the same groundwater report that, "Ever-declining ground water levels as a result of frequent dry spells and indiscreet sinking of bore wells, the ground water resources have been depleting and pushing the ground water scenario to the point of no return" (2007).



Figure 3: 25 meter irrigation and drinking water open well in Sunkishala, Voligonda Mandal, Nalgonda District. The water level estimates have dropped from 20m bgl (below ground level) during the dry season in 1995 to more than 24m bgl in the dry season of 2010. Wet season levels were approximately 10m bgl in 1995 and 18m bgl in 2010. Source: Bal Reddy, Farm Head Caretaker in Sunkishala.

Additionally, the decline in groundwater levels has increased fluoride concentration and further aggravated the already-existing fluorosis issue in the Nalgonda region. Consider Figure 3, which demonstrates the link between lower groundwater levels and higher fluoride levels in the district of Nalgonda, particularly looking at the Deverkonda mandal area (Brindha et al, 2011). The authors suggest that heavy agriculture quickens weathering of rock, which in turn contributes to leaching of fluoride-based minerals. Furthermore, groundwater evaporation is also a contributor, as the pattern may be seen in Figure 3. High fluoride concentration raises a significant health issue—dental and skeletal fluorosis causes permanent, severe degradation and deformation of bone structures in the body. Though there is no official census figure of how many people suffer from these conditions, the most recent water report from WaterSoft (2011), in a collaborative effort between the National Informatics Centre and Rural Water Supply Sector of the Government of Andhra Pradesh, states that 80,047 (or 2.6% of the district's

population) citizens do not have access to safe water. Public voice groups such as Nalgonda.org suggest that the number may be much higher.

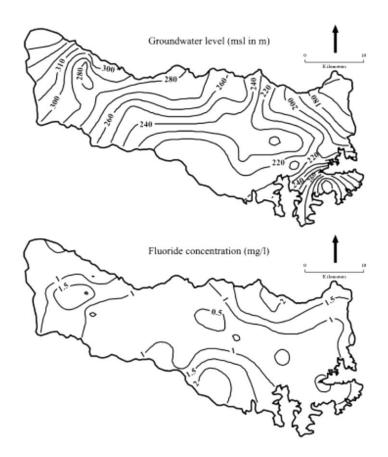


Figure 4: Link between groundwater level (above) and fluoride levels (below) in Deverkonda mandal. Notice how the topographical maps are similar. Brindha et al. (2011) suggest that the evaporation of groundwater and weathering of rock contribute to the high fluoride levels in the groundwater.

Another important public health consequence of Nalgonda's water supply to consider is the correlation between suicides and areas of lower groundwater levels, as presented in Figure 4 (Rafiuddin 2007). Brindha et al. (2011), Rafiuddin (2007), Suresh (2010), Venkataswarulu (2010), and other sources note the heavy emotional burden families feel during poor agricultural output, especially when combined with additional health problems that come with fluorosis in their children. Consider the following open

letter from family and friends of victims of water-related deaths in Nalgonda written to the District and State government; the undersigned describe their troubles:

"If you stumbled on this message that hangs in space for the next millennium, you already most likely know about our plight. Our bones are brittle, our teeth come in color, we seem to age faster and our babies do not have normal childhood - all works out to a different life style. All of this we owe it to [Fluoride]. We also owe it to several successive central and state administrations, local and other leaders that conveniently forgot about our drinking water problems... [Undersigned] – The People of Fluorine Effected Villages in Nalgonda District." - (Nalgonda.org, 2001).

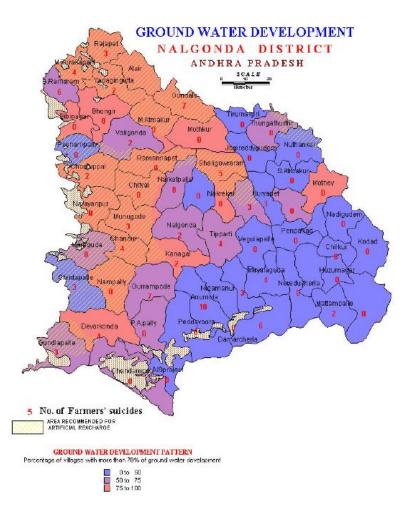


Figure 5: Number of farmers committing suicides by geographic area and ground water development.

In order to address the current water supply problems, the state and district government, with the aid of the World Bank, is attempting to tackle both domestic and agro-economic water demands on a large scale through the implementation of Alimineti Madhava Reddy (AMR) Lift Irrigation Scheme. The irrigation project, which RWS regards as a CPWS service, lifts water up 150 meters from the regional Nagarjuna Sagar Dam and feeds into a large, elevated reservoir; from there, the water travels via gravity and canal to a third of Nalgonda's habitations. Some of this water is treated at one of three water treatment facilities, and is then distributed as treated domestic water via gravity to western and central Nalgonda. Currently providing to over 900 villages, the Department of Rural Water Services hopes to expand provision to the remaining villages by 2020 (Venkataswarulu, 2010).

While these services are implemented with the intention of providing affected citizens with at least 40 lpcd of domestic water, they are currently falling short in many areas. Three main issues have inhibited this centralized framework from working. First, the long and sometimes-exposed pipelines have been subject to breakdown due to poorquality work by the contractor or lack of coordination with other construction projects, such as sewage and electrical lines. One often finds many of the roads dug up to repair the underground clean water pipe-bursts. Second, the maintenance structure at the point-of-use has been inconsistent and unreliable due to lack of ownership and proper education. Even if members of a community are willing, socio-cultural factors such as gender, caste, and status have led to corruption. Finally, water rights and damming practices have caused severe political rift between habitations, mandals, districts, regions, and even states. Given that Nalgonda's primary economy is agricultural, the political paradigm must balance water delivery across the district, often falling susceptible to corruption. For example, Chilkamarry is a small village along the AMR CPWS pipeline that does not receive water due to political favoring of a different part of the mandal. The habitation receives less than 20 lpcd because the pipeline currently bypasses the community. This balancing act has been a leading factor in the state's political instability, causing constant revolt in the northwest region including Nalgonda to secede Andhra Pradesh to form a new state called Telangana.

The regional government has assumed that a centralized water distribution infrastructure, a "shotgun" solution, is best for supplying and maintaining quality of the domestic water to the most people. Though that assumption may be valid in other socialecological systems, Nalgonda's current capacity limit inhibits rapid and expansive technological progress of domestic water supply (Suresh 2010, Venkataswarulu 2010). Rather than assuming and investing predominantly in a large-scale, centralized system, the decision-makers may be better served if they were to consider alternatives that have already worked in the district, such as community-led defluoridation plants or roof-based rainwater harvesting schemes. Before the consideration may even take place, the institutional structure must be aligned to receive, process, and build on collective capacity and social-ecological data. Specifically, there must be a mechanism for communication of information between institutional levels such that the district government may choose between several alternatives rather than choosing the most advanced technology available. While engineering feats such as the AMR Project are admirable, citizens may be better served by the technologies that best fit their capacity (Vollan, Ostrom 2009).

1.3 Water and Sanitation as Interrelated Issues





Figure 6: Lack of maintenance on the wastewater aqueduct in Chilkamari Gram Panchayat, P.A.Pally Mandal.

Figure 7: Drinking water tap next to the clogged wastewater aqueduct in Chilkamari Gram Panchayat, P.A.Pally Mandal.

Domestic water supply is not the only service affecting the health of citizens in Nalgonda, or India in general. Furthermore, South Asia ranks as the second lowest region by percentage in terms of sanitation coverage based on a WHO-UNICEF Report in 2006. A recent survey (2009) by the district's Rural Water and Sanitation Services unit finds that over 77% of the households in Nalgonda do not have a toilet, much less an Individual Sanitary Latrine (an improved toilet). Improper sanitation practices, such as open defecation, increases the chances of water contamination that may lead to water-and sanitation-related illnesses such as acute watery diarrhea (AWD), dysentery, and persistent diarrhea, such as giardia (Institute for One World Health, 2004). According to the UN-Water Global Annual Assessment (2010), "unsafe water, inadequate sanitation, or insufficient hygiene" account for 88% of all cases of diarrheal diseases worldwide. Further, the same report asserts, "the impact of diarrheal diseases on children is greater than the combined impact of HIV/AIDS, tuberculosis, and malaria" (2010). The report

also cites a WHO study from 2008 that estimates a reduction of 2.2 million deaths of children worldwide per year given improved water and sanitation services.

Water and sanitation are interdependent issues. The primary task of domestic water unit operations is to deliver clean, i.e. without biological, heavy metal, or mineral contamination, water for drinking, cooking, and hygiene. However, if proper hygiene is not followed, the filtration and treatment of water will have been for nothing. Thus, hygiene and sanitation are equally as important in maintaining the quality of the water product for the betterment of human health. With respect to Nalgonda, even without the fluoride crisis, poor sanitation has led to several thousands of cases of diarrheal diseases and malaria. While this research does not consider paired solutions, it acknowledges the importance of sanitation-related education in rural communities as a priority in realizing a healthier society (JMP 2012).

1.4 Problem Definition – Improving Assessment for more Informed Decisions

While several institutions work hard to assess systems needs and provide appropriate services, a comprehensive, participatory, and intra-institutionally integrated assessment and decision-support tool is missing from the process. As such, policymakers are forced to take decisions from raw data, general constituent petitions, and corporate lobbyists. The results of such decisions do not necessarily meet the needs it tries to address due to a lack of specificity and lack of communication across different service providers, communities-in-need, and governance institutions.

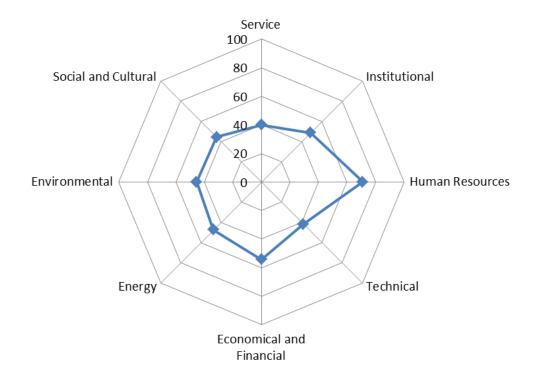


Figure 8: Initial Community Capacity Assessment of Nalgonda conducted with RWS Executive Engineer, D. Venkataswarulu (2010), and Assistant Engineer, Kandukuri Suresh (2010). Assessment in Appendix I.

It has been demonstrated that holistic information is not reason enough to invest in large-scale solutions (Vollan, Ostrom 2009). Above, a high-level Capacity Factors Analysis Methodology's Community Capacity Assessment of Nalgonda District is used to consider further the decision to implement large-scale infrastructure as supposed to localized infrastructure. Capacity Factors Analysis (CFA) decision-making methodology delivers a hierarchical holographic method of identifying areas for improvement and provides a quantitative capacity assessment of the community and used technologies. Further description of the CFA methodology itself is presented in Chapter 3. For the purpose of problem description, a preliminary community capacity assessment is conducted with the assistance of RWS engineers Kandikuri Suresh and D. Venkataswarulu (2010). As shown below in Figure 9, the preliminary results indicate that the Nalgonda district has a low-to-mid level capacity, an initial indicator that complicated alternatives, such as the AMR Project, that require high level capacity may fall outside of the district's management capacity, thereby increasing risk of system failures.

Events	Likelihood	Consequences
CPWS	CPWS	CPWS
1. Pipe bursts	1. Likely	1. Water service
2. Water contamination	2. Very Unlikely	 interruption (3-7 days) 2. Diarrheal disease outbreak (20% rise in cases)
3. Stealing/encroachment	3. Very likely	3. Pressure head loss, distribution problems
4. Alt Service interruption	4. Seldom	 4. Water service interruption (1-2 months), contamination
5. Energy outage	5. Likely	5. Water service int, pressure loss
PWS	PWS	PWS
1. Energy outage	1. Likely	1. Water service int (1-4 days)
2. Groundwater contamination	2. Area-dependent	2. Fluorosis incidences
3. Reservoir contamination	3. Seldom	3. Diarrheal disease outbreak (10% rise)
4. Motor breakdown	4. Seldom	4. Water service int (1-2 weeks)
5. Operation failure	5. Likely, varied	 5. Water service interruption, possible marginalization
Hand pumps	Hand pumps	Hand pumps
1. Dry well	1. Area- dependent	1. Investment in borewell drilling, possible increased distance for carrying water
2. Pump breakdown	2. Seldom	 Water service int (2-3 weeks)
3. Groundwater contamination	3. Area-dependent	3. Fluorosis incidences

 Table 1: RWS-highlighted failure events with corresponding domestic water supply service (Suresh 2010, Venkataswarulu 2010).

What does system failure mean in this case? With the help of the RWS Department, Table 1 was generated and shows failure events and their respective likelihoods and consequences. The events are broken into three categories, each corresponding with CPWS, PWS, or hand pumps. For the purposes of brevity, only the RWS-highlighted events are provided. Several observations may be drawn from the failure events listed in Table 1. The most dramatic consequences are water service interruption for lengthy periods, incidences of fluorosis, and incidences of diarrheal diseases. The most likely events correspond with some length of water service interruption. In addition to the above technology-specific failure events, systemic failure events are also present, such as regional drought. How well each technology responds to its respective failure event depends not just on the technology, but also the stakeholders that operate and maintain the technology. The greater the gap between a technology's required capacity and a community's current capacity, the greater the risk for a failure event such as one highlighted above. The problem, thus, is not what the technology is capable of, but what the community is capable of doing with any respective technology. It is this resonance that fosters a sustainable social-ecological-technological relationship.

The author's research considers this resonance, and hypothesizes that decisionmakers are better able to meet communities' demands against the backdrop of resource limitations if they are to employ a *comprehensive, participatory, and intra-institutional assessment framework*. With such a tool, decision-makers will be able to better make informed decisions. This systemic perspective may not alter the final decision itself, but may provide a path for better risk management of failure events such as those aforementioned.

Chapter 2: Research Relevance, Motivation, and Goal

MILLIONS REST OF WORLD 292 CHINA 119 INDIA 97 NIGERIA 68 ETHIOPIA 46 INDONESIA 43

2.1 Water Scarcity around the World

Louis (2002) defines basic human services as "those absolutely necessary for human survival," and further identifies them as water, food, sanitation, clean air, household energy, proper shelter, and personal security. These services are interdependent and correlate positively to the standard of living in communities across the world; and several case studies (Hardin 1968; Ostrom; Louis; Bouabid 2004; Henriques 2009; Yamakoshi 2008) note that the services cannot be just provided at one instant time, but rather continuously and sustainably. As noted in Chapter 1, India ranks second highest in those with without access to improved access to water supply. The United Nations (UN) and World Health Organization (WHO), in concurrence with other non-governmental organizations (NGOs), defined guidelines (see Table 2) for acceptable

Figure 9: Breakdown of the remaining 783 million people without improved access to water by country. India ranks second with 97.1 million people with improved access to water (Joint Monitoring Programme 2012 report).

access to drinking water and sanitation, dubbed "improved drinking water sources" and "improved sanitation facilities."

Drinking Water Guidelines	Sanitation Guidelines	
Improved Drinking Water Sources	Improved Sanitation Facilities ^b	
 Piped water into dwelling, plot or yard Public tap/standpipe Tubewell/borehole Protected dug well Protected spring Rainwater collection 	 Flush or pour-flush to: Piped sewer system Septic tank Pit latrine Ventilated improved pit latrine Pit latrine with lab Composting toilet Unimproved Sanitation Facilities 	
 Unprotected dug well Unprotected spring Cart with small tank/drum Bottled water ^a Tanker-truck Surface water (river, dam, lake, pond, stream, canal, irrigation channels) 	 Flush or pour-flush to elsewhere Pit latrine without slab or open pit Bucket Hanging toilet or hanging latrine No facilities or bush or field 	

Table 2: Definition of Improved Drinking Water Sources and Improved Sanitation Facilities

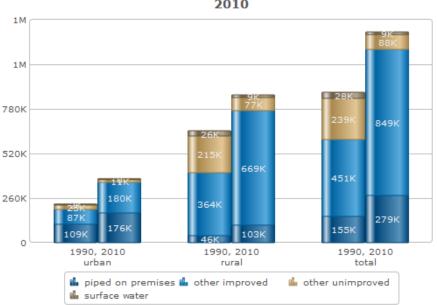
^a Bottled water is considered improved only when the household uses water from an improved source for cooking and personal hygiene.

^b Only facilities which are not shared or are not public are considered improved.

^c Excreta are flushed to the street, yard or plot, open sewer, a ditch, a drainage way or other location

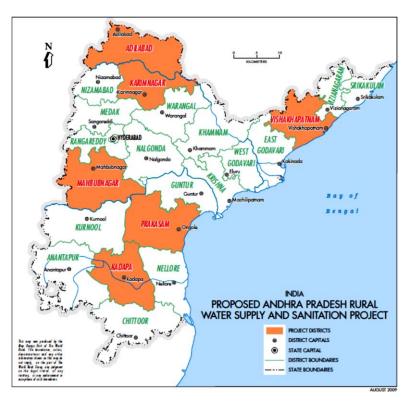
Even with access to improved drinking water sources, significant risks in drinking quality still exist with untreated water from protected wells, boreholes, or springs. For example, a well-covered groundwater well may still be susceptible to heavy metal or nitrogenous contaminants. Piped water supply systems are low risk in terms of exposure to poor water quality and water-borne illnesses. Diseases or illnesses that result from unsafe drinking water include, but not are limited to diarrhea, ascaris, dracunucliasis, hookworm, schistosomiasis, fluorosis, and trachoma. Consequences of illnesses include loss of productivity, paralysis, blindness, weakening of the immune system, bone and teeth decay, and even death.

As such, piped water supply ensures the most standard drinking water supply quality across the village as well as an easy venue for proper maintenance, ensuring a step towards a sustainable infrastructure. Unfortunately, only 20% of the Southern Asian population has access to a piped water system, even though 80% of the regional population has access to improved drinking water sources. This additional challenge of addressing not only general access, but also a sustainable and proper means of doing so, must also be considered. The following figure from the WHO-UNICEF report outlines the improvement in drinking water and sanitation coverage in India.



Population with access to drinking water in India in 1990 -2010

Figure 10: Drinking water coverage in India. Note that the blocks are in thousands, so a K on the bar graph denotes 1 million people. Source: JMP Report 2012



2.2 Background on Nalgonda and its Current Water Condition

Figure 11: Map of Andhra Pradesh with World Bank's proposed rural water supply and sanitation project. Nalgonda is located next to the state capital (World Bank, 2009).

To better understand the district of Nalgonda, the general status of the state of Andhra Pradesh, shown in Figure 12, must be considered. The state itself has a rural population of 56.3 million out of a total 84.6 million people (Census of India, 2011). As per the standards described above by the UN Development Programme and WHO, a recent Andhra Pradesh Rural Water Supply report notes that 54.8% of the habitations in the state have 100% coverage, implying that all people in those villages have access to 40 liters per capita daily (lpcd) located within a 1.6 km and 100m from the center of the respective village. This also indicates that 45.2% do not have full coverage, and that breakdown is shown in Table 2. The WHO designates three statuses to villages and communities regarding their access to water: fully covered (FC) implies that the above criteria have been satisfied, partially covered (PC) implies that at least one of the criteria has been satisfied or certain water quality issues may exist, and not covered implies that the criteria have not been met at all.

% of Population Coverage	# of Habitations	% of Habitations
0	1,222	1.70%
1-25	4,347	6.04%
26-50	7,802	10.84%
51-75	9,517	13.22%
76-99	9,615	13.36%
100	39,478	54.85%
Total	71,981	100.00%

 Table 3: Water coverage in Andhra Pradesh by number and percent of habitations in each quartile of coverage

About 75% of rural water comes from groundwater wells, which due to rapid population and economic growth in demand as wells as periodic droughts have become over-exploited (Rafiuddin, 2007). Over half of the mandals in Nalgonda are characterized as semi-critical, critical, or over-exploited in ground water development status. Rural villages depend on single or multiple village schemes for an organized structure to receive water. Ideal service includes piped water supply and household connections; however, the access needs to be sustainable. Over 20% of the Single Village Schemes (SVS) and Multi-Village Schemes (MVS) are currently "not fully operational and require rehabilitation or augmentation" according to an analysis recently conducted by the World Bank (World Bank 2007). The study cites lack of funds, institutional structure, and technical expertise as reasons for breakdown.

The above trends are common across the districts that constitute the State of Andhra Pradesh, but each district also has its own issues. The District of Nalgonda in Andhra Pradesh, India is located immediately east of the state's capital, Hyderabad. The district, shown in Figure 13, has a population of above 3.48 million persons spread across 59 Mandals, 1175 Gram Panchayats, and 3,385 state-approved habitations (towns and villages). A small group of towns and villages make up a Gram Panchayat, and several tax-paying Gram Panchayats constitute a Mandal. The two prime drivers of the district's economy are its agriculture and mineral mining. Nalgonda's rural population as per the 2011 Census was approximately 86% of the total district population.

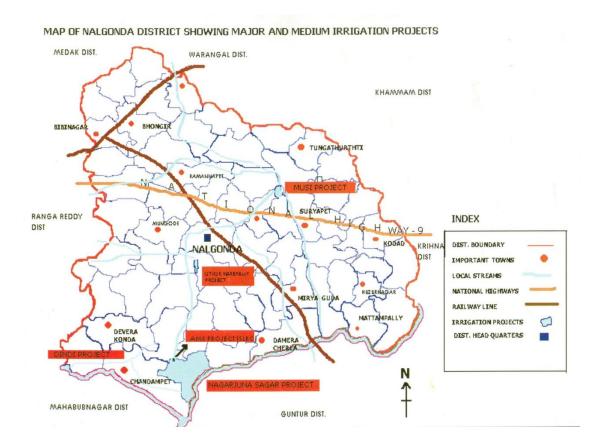
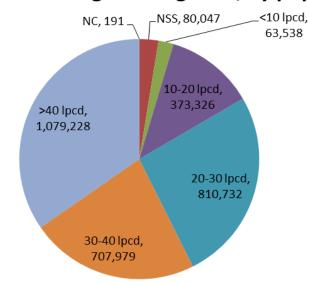


Figure 12: District map of Nalgonda including seasonal tributaries, rivers, reservoir, and Mandal headquarters. The light-blue overlay by the large reservoir at the bottom is the nearly-completed AMR project. Other proposed (some started) projects are also displayed. Source: Water Resources Information System, 2004.

Geographically, Nalgonda has an area of 14, 217 km², which constitutes just above 5% of the total area of Andhra Pradesh. Nalgonda receives an average rainfall of 770 mm (or about 30 inches) per year. Nearly three-quarters of this rain occurs during the monsoon season, an intense 40-45 days of rain following the summer. The summers are hot and dry, with temperatures consistently above 40 degrees Celsius (of above 100 degrees Fahrenheit). The annual rainfall is not consistent and often causes large losses in investment of the agro-economy due to uncertainty. Figures 13 and 14 show the most recent water coverage in Nalgonda by population and habitation, respectively (WaterSoft, Nalgonda Rural Water Services, 2010). The graphs show that approximately two-thirds of the district population does not meet the WHO 40 lpcd benchmark; in addition, over 80,000 people's only access is to unsafe water. Note that this does not imply that other citizens are immune from mineral contamination or unexposed to pathogens causing diarrheal health defects.



Water Coverage in Nalgonda, by pop.

Figure 13: Domestic Water Supply Coverage in Nalgonda. NC indicates those without any water supply. NSS indicate those currently receiving known unsafe sources of water (such as excessive fluoride). (Nalgonda WaterSoft, Rural Water Supply Sector of Andhra Pradesh, 2010)

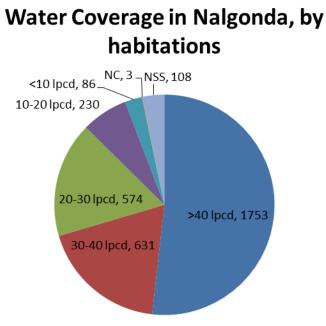


Figure 14: Domestic Water Supply Coverage by Habitation in Nalgonda. As with the previous graph, NC indicates villages without any water and NSS indicates villages with unsafe sources of water (such as excessive fluoride). (Nalgonda WaterSoft, Rural Water Supply Sector of Andhra Pradesh, 2012).

2.2.1 Fluoride in Nalgonda

In addition to the unsure annual water supply, the quality of the water is also poor. As per the WHO's 3rd edition release of drinking water quality standards, the guideline amount of fluoride in water is 1.5mg/l (WHO 2008). Parts of Nalgonda, however, far exceed the guideline amount to over 10 mg/l. Because of the excessive fluoride content, a significant portion of the population suffers from fluorosis, which leads to dental and skeletal degradation and deformation. The World Bank states that 48 of 59 Mandals have at least five villages affected by fluoride. A public interest group, Nalgonda.org, states that over 20,000 citizens of the district suffer from severe skeletal fluorosis (Figure 10), and cites a BBC article expressing that the hundreds of thousands more suffer from lower levels of fluorosis (Farooq 2003). As shown in Figure 13 from the earlier section, there are still over 80,000 people whose primary access to water is contaminated with excessive fluoride. As of 2012, 108 villages were categorized as NSS. Especially in these villages, as well as others, people suffer from symptoms of dental and skeletal fluorosis. Dental fluorosis includes yellowing, deformation, and general weakening of the teeth. Skeletal fluorosis includes deformation of the bone as shown in Figures 15 and 16.



Figure 15: A child with severe skeletal disfiguring; affected by fluoride in Nalgonda. Source: www.nalgonda.org



Figure 16: A 44-year old woman suffering from skeletal fluorosis in Narayanpur, Nalgonda. Source: Site Visit, 2011.

In response to the fluoride levels and the lack of action, several citizens sought to

petition the government in addition to general open letters from public interest organizations. One such petition from P.R. Subas Chandran prompted a government response that acknowledged the fluoride condition of Nalgonda's villages:

"In the affidavit filed in support of the writ petition, the petitioner states that out of 1178 villages in Nalgonda district, people of nearly 691 villages suffer to consumption of water containing high levels of fluoride. The consumption of such water has made many people partially disabled and crippled beyond redemption. All the residents of the said villages, suffer in some measure o the other either biologically or psychologically or sociologically. The petitioner further submits that the permissible limit of fluoride content in water, prescribed by World Health Organisation (WHO), is 0.5 to 0.8 PPM (Parts Per Million). However, the drinking water in the various villages of Nalgonda district has high fluoride content ranging between 1 and 13 PPM, which is 200% more than the permissible limit prescribed by WHO. The water with high fluoride content in Nalgonda district has become a silent killer and people living in the affected villages have started deserting them for want of safe drinking water."

 Honourable Chief Justice S. B.
 Sinha and Justice V.V.S. Rao (August 24, 2001)

Thankfully, in the public interest litigation case, the High Court of Judicature in Hyderabad, Andhra Pradesh had directed that the District Collector to supply water with "optimum fluoride content through water tankers [to acute level areas initially] till the projects/schemes undertaken have been completed." Furthermore, the Government was directed to give special medical attention, work with NGOs, educate, and if necessary evacuate citizens in fluoride-affected areas (Sinha, Rao 2001). After the passing of this judgment in 2001, the results are only now starting to be realized (Venkataswarulu 2010).

2.2.2 Water distribution network in Nalgonda

After having discussed water source and water quality, it is now appropriate to consider the domestic water distribution network in Nalgonda. Much has already been introduced in the background chapter. RWS reaches habitations in three main ways: groundwater hand pumps, protected water supply schemes (PWSS) or single-village schemes (SVS), and comprehensive protected water supply schemes (CPWSS) or multiple village schemes (MVS). Hand pumps are standard for smaller villages, but over 15% have either dried up their groundwater sources or are not functional. PWSS, or just SVS if the scheme only covers one habitation, also typically uses groundwater for source and relies on electricity to pump and store in an overhead storage reservoir (OHSR) or

ground level storage reservoir (GLSR). PWSSs typically serve villages of population of up to 5,000 people.

Finally, CPWSSs are large, centralized distribution water networks with a surface water body for source, large treatment plants, and gravity-fed pipes for supply lines. In this particular case, the CPWSSs derive from the AMR irrigation project from Nagarjuna Sagar. Of the 3,385 habitations in Nalgonda, hand pumps and PWSSs are the most common as shown in Table 4; however, just as supply pipelines in CPWSS fall susceptible to pipe bursts and water theft, PWSSs face more socio-cultural obstructions such as lack of empowerment leading to poor maintenance (Venkataswarulu 2010). Though the RWS department designs all local storage systems (OHSRs and GLSRs), the actual construction and first two years maintenance is handled by contractors, after which it is turned over to local Gram Panchayats (Venkataswarulu 2010).

Type of schemes	Number of Schemes	# of Habitations Served
Hand pumps	19,902	Almost everyone
PWSS	2,817	>2,000
CPWSS	13	~900 (varies)

Table 4: Water supply means for the District on Nalgonda

Chapter 3: Review of Risk and Capacity Assessment Methodologies

The goal of this research is to provide a comprehensive, participatory, and intrainstitutional assessment framework that better aids decision-makers at different levels of responsibility and decision-making. First, it is important to review the leading waterrelated decision-aiding tools in the field.

3.1 General Frameworks for Risk and Capacity Assessment

As introduced earlier, several methodologies exist. The WHO and UNICEF created the Rapid Assessment of Drinking Water Quality (RADWQ) as a support tool for surveying water systems ("RADWQ: A Handbook for Implementation" 2008). RADWQ is primarily a sampling tool to understand water demand and quality in a certain area. While it is certainly participatory, the tool does not meet the comprehensiveness or intrainstitutional objectives. World Bank employs its own tools as well. In conjunction with the World Bank's two main decision support systems: Demand Responsive Approach (DRA) and Methodology for Participatory Assessment (MPA), which serves primarily to complement DRA. The DRA approach is a participatory design framework that puts the fate of the project in the community's hands. There are several strong-suits to the DRA: first, the role of women is encouraged; second, water is treated as an economic resource, which thereby encourages private sector collaboration; and third, it is demand-driven (Parker and Skytta 2000). There are two pitfalls to this approach, however. The DRA does not account for system externalities or sub-system interactions, thereby falling short in the comprehensive and intra-institutional integration objectives. Secondly, as the World Bank encourages the participation of DRA, the methodology only accounts for established institutional leadership rather than on-ground leaders.

UNICEF employs the Multiple Indicators Cluster Surveys (MICS), which selects test sites across a region and extrapolates the results to a larger area. The cluster sampling approach helps reduce sampling costs while using the common geographic correlations to combine sample points to achieve an affective understanding of an area. The survey tests at both the source and household level; additional influents to the water supply can thus be identified. MICS was originally conceived as a tracking tool for different projects, but quickly evolved to become a comprehensive, participatory, and iterative assessment framework used widely through UNICEF's projects. The one shortfall of MICS, as with most methodologies, is the lack of intra-institutional information sharing, which causes information silos and uninformed, and sometimes counteractive decision-making at different institutional levels.



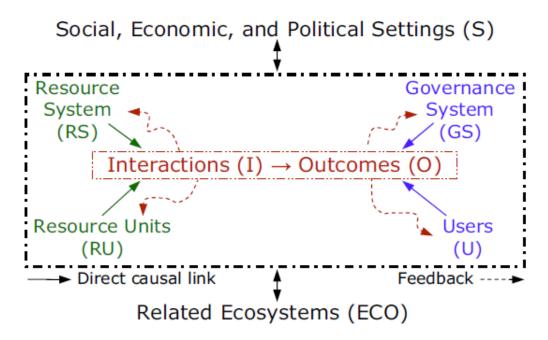


Figure 17: A multitier framework for evaluating sustainability of SESs. Source: Ostrom, 2007.

Now we consider the two methodologies that this research most heavily considers. The first is a brainchild of Elinor Ostrom, a Public Policy and Economics Professor at the University of Indiana. Recognizing the inherent complexities associated with large social-ecological systems, such as Nalgonda's domestic water supply system, Ostrom created a framework to view the said system through different perspectives. An avid follower of Garrett Hardin, Ostrom realized that there are several major players, resources, and entire sub-systems in any given system, and the model should strive to include and identify each as a part of the model.

Haimes (2004) would consider this similar to the mathematical foundation of building a state diagram of a system, shown in Figure 18, through the use of Hierarchical Holographic Modeling (something that Ostrom's framework has in common with Louis' Capacity Factors Analysis methodology). What differentiates Ostrom's model from others is the emphasis on governance and qualitative adjustment. Ostrom realized that with such complicated models of complex systems, the decision modules remained with decision-makers at the multiple governance levels.

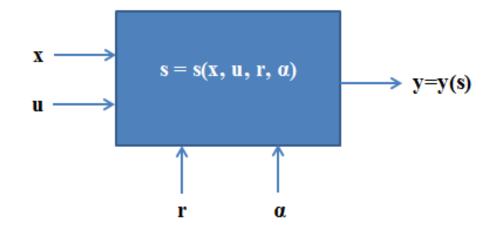


Figure 18: Haimes' mathematical model of a state diagram. The vector x represents the set of decision variables, vector u represents the set of input variables, vector r represents the set of random variables, vector α represents the set of exogenous variables, vector s represents the set of state variables (which is a function of the previous state variable, x, u, r, and α), and vector y represents the output variables (which is a function of the state variable. The box represents the system. (Haimes, 2004).

Dietz and Ostrom (2003) argued that any quantification or generalization of variables delegitimizes the correlation of models to reality. As such, Ostrom over many of her collaborations sought to define a framework for assessing Social-Ecological Systems (SES), which is what she called the complex, inter-related resource-governance systems. In a working paper, before she passed away during the summer of 2012, Ostrom and her co-author Michael McGinnis (Working paper, 2012) described the SES framework:

"The SES framework was originally designed for application to a relatively well-defined domain of common-pool resource management situations in which *resource users* extract *resource units* from a *resource system*, and provide for the maintenance of that system, according to rules

and procedures determined by an overarching *governance system*, and in the context of *related ecological systems* and broader *social-politicaleconomic settings*."

Continuing with the comparison to Haimes' mathematical model of a state diagram, Ostrom's framework can be seen as a method for characterizing social-ecological systems. Given such a model setup, the framework strives to address correlations rather than simple generalizations that output "panacea solutions" (2007). This sentiment is understandable – for in attempting to model complex or even complicated systems, nuances are lost in the process. She suggests drawing SES boundaries, identifying interacting subsystems or overarching classes, and comparing on a multi-tier level. Figure 15 depicts her general framework.

Table 5 shows the second-tier variables to be evaluated within each subsystem. The tier denotes not a hierarchy of systems, but rather a further clarification of the respective variables considered in the system. Viewing through the lens of Haimes' mathematical model, each second-tier variable would be considered a member of the vector set. For example, all the second-tier variables that compose the resource unit would be considered as the state variable vector.

While this model is certainly comprehensive and intra-institutional because of its emphasis on governance, it doesn't provide easy access to the relevant stakeholder groups for participation. Though it allows for qualitative feedback, that only arrives again in a consultative manner rather than participatory. Another major drawback for using this framework was that the lack of quantification of leads to subjective findings and

34

difficulty in replication. Furthermore, it is difficult to provide recommendations with any

specific technology solution for a habitation or a policy for a Mandal or District given the

lack of a reverse assessment of requirements for the use of those respective alternatives.

Table 5: Second-tier variables for understanding the interactions between subsystems of a Social-
Ecological System. Source: Ostrom 2007.

Social, Economic, and Political Settings (S)

S1- Economic development. S2- Demographic trends. S3- Political stability.

S4- Government settlement policies. S5- Market incentives. S6- Media organization.

Resource System (RS)

RS1- Sector (e.g., water, forests, pasture, fish) GS1- Government organizations

RS2- Clarity of system boundaries

RS3- Size of resource system

RS4- Human-constructed facilities

RS5- Productivity of system

RS6- Equilibrium properties

RS7- Predictability of system dynamics

RS8- Storage characteristics

RS9- Location

Resource Units (RU)

RU1- Resource unit mobility

RU2- Growth or replacement rate

RU3- Interaction among resource units

RU4- Economic value

RU5- Size

- RU6- Distinctive markings
- RU7- Spatial & temporal distribution

GS2- Non-government organizations

- GS3- Network structure
- GS4- Property-rights systems
- GS5- Operational rules
- GS6- Collective-choice rules
- GS7- Constitutional rules
- GS8- Monitoring & sanctioning processes

Users (U)

Governance System (GS)

- U1- Number of users
- U2- Socioeconomic attributes of users
- U3- History of use
- U4- Location
- U5- Leadership/entrepreneurship
- U6- Norms/social capital
- U7- Knowledge of SES/mental models
- U8- Dependence on resource
- U9- Technology used

Interactions (I) → Outcomes (O) e users O1- Social performance measures

- I1- Harvesting levels of diverse users
- I2- Information sharing among users
- I3- Deliberation processes
- I4- Conflicts among users
- I5- Investment activities
- I6- Lobbying activities

- (e.g., efficiency, equity, accountability)O2- Ecological performance measures(e.g., overharvested, resilience, diversity)
- O3- Externalities to other SESs

Related Ecosystems (ECO)

ECO1- Climate patterns. ECO2- Pollution patterns. ECO3- Flows into and out of focal SES.

3.3 Louis' Capacity Factors Analysis Methodology

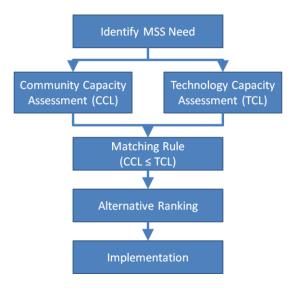


Figure 19: Louis' Capacity Factors Analysis risk methodology. Measure capacity across eight different factors and recommends the most appropriate technology for implementation. Source: Henriques 2009.

Louis (2002), Louis & Bouabid (2004, 2006), Louis et al. (2005 – Louis, Castillo, Henriques, Mardikanto, Yamakoshi, Williams – Florence Italy) suggest a slightly different holistic risk analysis module to assess community capacity and development. The Capacity Factors Analysis (CFA) approach is a decision support tool designed to help developing communities select an appropriate technology for their municipal water and sanitation services. CFA is a great design tool in curbing side effects of improper Drinking Water Supply (DWS) design and implementation.

Capacity factors are defined as characteristics that determine a community's ability to manage their MSS. The CFA approach outlines eight main capacity factors, as displayed and defined in Table 4 from Bouabid (2004) and Henriques (2008). The methodology relies on a set of weights as communicated by the stakeholders that draw importance to specific capacity factors, and thus able to calculate a Community Capacity Level (CCL) – essentially the perceived capabilities of the community. Bouabid (2004)

compiled a list of technologies at their respective minimum CCLs, defined as Technology Requirement Level TRL). A matching strategy, as the one used in Henriques (2008), may then propose alternative technologies given appropriate fits between the TRL and CCL. Since the TRL may vary by region, a more standardized list is listed as the future work of Bouabid (2004).

Capacity Factor	Requirements that constitute the Capacity Factor
Service	Supply of water: Quantity, quality, accessibility (distance)
Institutional	Body of Legislation, Associated Regulation, Administrative Authority, Administrative Process, and Governance
Human Resources	Professionals, Skilled Labor, Unskilled Labor, Literate, and Illiterate
Technical	Operations, Maintenance, Adaptation, Supply Chain, Support Services
Economic/Financial	Private Sector, Bond Rating, User Fees, Budget, Asset Value, Debt
Energy Capacity	Primary Source, Back-up, Percentage of Budget, and Outage Rate
Environmental/ Natural Resources	Quality/Sensitivity; Stock of Resources: land, water, soil type, and Precipitation
Social/Cultural	Communities, Stability, Equity, Castes, and Women Participation

Table 6: Each capacity factory is essentially a risk category defined by the requirements on the right-hand side, Source: Bouabid (2004), Henriques (2008)

Appendix I shows a high-level community assessment using the CFA methodology. The data for the assessment came from the preliminary discussions with Suresh (2010) and Venkataswarulu (2010), accredited engineers in the Department of Rural Water Supply Services as a part of the 2010 Summer Research Trip to Nalgonda approved by Minister Komatireddy Venkat Reddy and District Collector S.A.M. Rizvi. Future assessments will use the same data set to expand and compare recommended

alternatives. Each CF has sub-variables or requirements with respective established benchmarks. For example, outage rate is a part of assessment for the Energy CF; benchmark outage rates are used to normalize scores rather than unintentionally overweigh any single requirement or CF. Henriques (2008) compiles a set of the benchmark values that would fall into one of five scoring partitions. Though the score may vary within the partition bounds, the methodology helps normalize unrelated benchmarks quantitatively and produces a comprehendible numeric score.

Furthermore, note that the weights of requirements are not all equal; they are dependent on the engineers' perceived importance of one requirement with respect to others under the category CF. In the case study that Henriques (2008) presents for the evaluation of the Cimahi region in Indonesia, he assumes equal weights for requirements under each CF. During research, it was clear that the stakeholders valued certain requirements over others – for example, the governance requirement under the Institutional CF was more valued than others in the category because of perceived action capability. While this means that the Governance produces more actionable agenda.

3.4 Strengths and Weaknesses of Louis' CFA and Ostrom's SES Assessment Frameworks

The World Bank and UNICEF frameworks make sense given their use, users, and intended implementation time of technologically-oriented solutions. However, to understand a community's capability in using those technical solutions, it is necessary to consider all interacting factors—from energy to surrounding ecosystems. Both Ostrom and Louis propose holistic frameworks that cater solutions to communities, rather than forcing intervention into communities via solutions. While these methodologies may seem similar, their respective strengths and weaknesses are different depending on implementation.

Ostrom's general framework for assessing social-ecological systems does not consider technological limitations other than resource and economic units. One may also find it difficult to understand the main takeaways from qualitative assessment. Furthermore, a framework heavily invested in assessing social/institutional/political settings might come off offensive to the current community and governance due to sociocultural differences. On the other hand, the qualitative assessment allows for a more comprehensive decomposition of the same factors across multiple different governance levels. In addition, the use of resource units provides a better grasp of feasibility and availability.

Louis' CFA methodology also has some limitations. It is difficult to validate the quantification of social concepts, such as castes. Requirements also need to be modified with context, as is encouraged by the weighting system (Henriques 2008). This makes it harder to evaluate quantitatively across different governance levels. Some strengths of

CFA include its emphasis on systematic and quantitative assessment, which is much easier to visualize. The weighting system allows for solutions catered to the specific community's needs and wants. The requirements are judged against current, research benchmarks, such as the WHO's 40 liters per capita daily (Henriques 2009). The strengths and weaknesses of both frameworks are summarized in Table 7.

 Table 7: Strengths and Weaknesses of Capacity Assessment Frameworks: Louis' Capacity Factors Analysis and Ostrom's Social-Ecological System Assessment.

	Weaknesses	Strengths
Capacity Factors Analysis	 Difficult to validate quantification of social concepts, such as castes Requirements might need to be modified for each context Hard to translate for daily assessment use in communities by local officials Harder to assess for larger communities 	 Quantitative assessment is easier to visualize Weight system allows for an assessment catered towards the community's needs Requirements are judged against accepted benchmarks Partitioned for better understanding
Ostrom's Framework	 Difficult to understand the main takeaways from qualitative assessment Does not consider technological limitations other than in economic units A social/institutional heavy framework might be offensive to the current community & governance 	 Qualitative assessment allows for a more comprehensive decomposition of social, economic, and institutional factors Use of resource units provides a better grasp of physical availability and feasibility

Inherent in both assessments is the consideration of adaptation-side risk associated with implementing any particular technology or policy. Both Louis and Ostrom attempt to address, though not explicitly, this psychological dimension in their respective methodologies by assessing whether the community members are willing and capable of a newly introduced alternative to that community's ecological system. Kenneth Maton and Deborah Salem are researchers in the field of applied psychology; they would define this psychological empowerment as "the active participatory process of gaining resources or competencies needed to increase control over one's life and accomplish important life goals" (1995).

Chapter 4: Service Mission and Research Goal

Given the author's hypothesis that a comprehensive, participatory, and intrainstitutional assessment tool may better aid and inform decision-makers, this research proposes the creation of a hybrid of the SES framework and CFA methodology.

4.1 Service Mission

Given that the motivation for this thesis concerns the shortcomings of the socialecological system of domestic water service in Nalgonda, it is appropriate to recognize a service mission: The product of this thesis proposes tangible recommendations for possible technology alternatives, where necessary, in specific areas of Nalgonda. Additionally, policy alternatives for higher governance levels are also be recommended. These recommendations have been provided to the approver and participants of the research: Minister Komatireddy Venkat Reddy and relevant departments (such as the Rural Water Services Department). A publication has already been relayed back to the investing stakeholders regarding the research components of this project. The status of these recommendations will be reflected on during the discussion section.

4.2 **Research Goal and Objectives**

To address the lack of assessment framework for community-specific solutions, a more comprehensive framework must be developed. In addition, policy makers at different decision-making levels or different governance levels should also be able to receive aggregated information to foster more sound investments. Ostrom's general framework for assessing the sustainability of social-ecological systems (SESs) helps establish the system boundaries, players, and interaction affects. Coupled with Louis' CFA's guiding capacity factors, the combined adaptation can dissect Nalgonda's rural domestic water distribution network and pave the way of understanding relationships between different stakeholders, governances, and resources subsystems.

Research goal: to create a hybrid decision-aiding tool that reduces the risk of failure events associated with policy-adopted domestic water technologies.

Such a framework must be able to meet the following objectives:

- Comprehensive rather than focusing on demographic or physical system data, the tool should help draw a more holographic view of the system that includes random and exogenous variables.
- Participatory as noted by Maton, the essence of a sustainable policy starts with the retainers of the intended target of the policy, the stakeholders. A communitybased and –led framework ensures that the results are adopted.

 Intra-institutional – as delineated in Ostrom's framework, multiple governance systems drive policy implementation. As such, the framework should strive to include them.

This research addresses this problem by proposing a comprehensive risk and capacity assessment decision-support tool. The product of the application of such a methodology with respect to the case study of Nalgonda is anticipated to be a set of multi-tiered technological and policy alternatives. In order to assess whether the above objectives were achieved, certain questions are posed at the end of the study. These questions are based on the objectives, but also the respective weaknesses of the SES and CFA frameworks.

Comprehensive:

- Does the framework account for input from the following factors:
 - Service currently provided
 - Capacity of the formal institutions
 - Capacity of human resources/labor available
 - Capacity to operate, maintain, manage, and evolve technological systems
 - Capacity for economic activity and financial planning
 - Capacity of energy efficiency and reliability
 - Capacity of ecological awareness and environmental sustainability
 - Capacity of societal structure
- Does the framework allow for both quantitative and qualitative feedback?

Participatory:

- Are people for whom the system is being designed part of the process?
 - Answering questions during capacity assessment
 - Engaged in posing questions, maintaining dialogue
 - Fit Maton's description for
- Do the leaders find the process helpful for themselves?
- Do the people involved in the process feel capable of "gaining resources or competencies needed to increase control over one's life and accomplish [water supply-related goals]" if given ownership over application of the process?

Intra-institutional:

- Are leaders at different institutional levels able to communicate?
 - Are leaders of a lower institutional level able to provide feedback that is considered seriously by their corresponding superior?
 - Do leaders of higher institutional levels feel confident about making decisions on behalf of their respective constituencies?
- Is there a scale for measuring overall capacity, at different governance levels of habitation, mandal, and district?

Given the preliminary results from the CFA methodology shown in the previous chapter, it is predicted that the set may emphasize lower capacity systems such as rainwater harvesting.

4.3 Research Activities

Upon building the hybrid CFA-SES assessment tool, the author conducts a more comprehensive assessment of the water supply technologies currently employed in Nalgonda. Three specific alternatives are considered – centralized water supply systems like CPWS, groundwater systems like PWS and hand pumps, and rainwater harvesting systems. Data from 38 habitations across 20 mandals is available from the 2010 Summer Research Trip, which was sponsored by the Andhra Pradesh's Minister of Information Technology, Minister Komatireddy Venkat Reddy, and approved by the Officer of Collectorate of Nalgonda by I.A.S. Officer Rizvi. An assessment of these habitations, their corresponding mandals, and finally the district is conducted, each at its respective institutional level. Thereafter, each community is matched with the best-suited alternative. For mandal-level and district-level recommendations, corresponding water policies are considered.

Chapter 5: Louis-Ostrom Comprehensive Capacity Assessment

In order to better assess a large community's capability to successfully and sustainably adapt technological solutions, the Louis-Ostrom Comprehensive Capacity Assessment is developed The LOCCA method essentially compiles the strengths of the CFA and Ostrom's SES assessment framework. It has four main components. Figure 20 depicts a general overview.

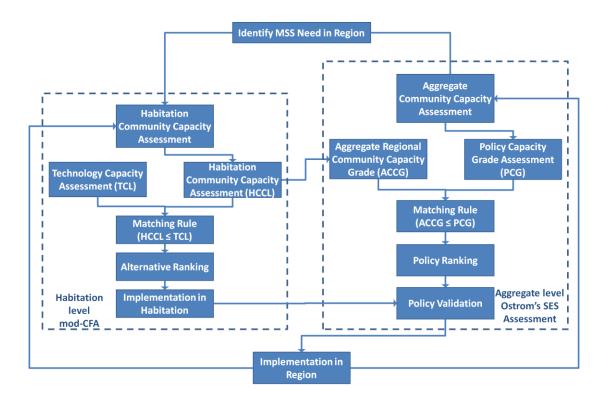


Figure 20: The Louis-Ostrom Comprehensive Capacity Assessment (LOCCA) Method. A slightly modified-CFA is used to quantitatively assess the habitation capacity and the aggregated data is used to qualitatively assign a letter grade to the respective Mandal.

First, the analyst must identify the need for improvement, such as the overview provided in Chapters 1 and 2. Note that this need does not necessarily have to be limited to water infrastructure. However, the scope of this thesis is limited to domestic water supply, and as such, the benchmarks are chosen to reflect to the water infrastructure application of the framework. Second, the analyst performs a modified Capacity Factors Analysis (mod-CFA) at the habitation level—this involves assessing the habitation's community capacity (HCCL), checking alternative technologies that may improve the habitation's water service, matching with relevant applicable technologies, choosing the best alternative, and implementing that alternative in the respective habitation. The mod-CFA HCCL is slightly different from the CFA's CCL because of compounded requirements from Ostrom's SES assessment second-tier variables. For example, "Loss to Corruption" was one of the benchmarks added under the Economic/Financial Capacity Factor in lieu of a corresponding variable in Ostrom's SES assessment.

Third, the LOCCA method uses the data from the individual habitation assessments, compiles them, and employs Ostrom's SES assessment to assign letter grades for the aggregate communities. In India, the aggregate communities are composed of Mandals, Districts, Regions, States, and the National government. The letter grades represent partitioned levels for the Mandal's collective capability. The letter grade system was chosen to emphasize the qualitative nature of Ostrom's SES framework as well as to differentiate capacities between local habitation and higher governance levels. After the Aggregate Community Capacity Grade (ACCG) is issued, corresponding policies are considered. Similar to the CFA procedure, if policies seem "too advanced" for the aggregate community, they are eliminated via a matching rule. Then, the policies are ranked and chosen given alternative considerations.

Finally, if the corresponding technological alternatives seem successful, the respective policy extends the implementation of the alternatives to the rest of the Mandal. For the purpose of this thesis, only three locally-available technology-related policies are

considered: 1) installation of comprehensive protected water supply scheme (CPWSS), 2) proliferation of protected water supply scheme (PWSS), and 3) rainwater harvesting schemes, of which roof-based and Oorani are considered. The associated capacity levels for each scheme are discussed in the next chapter.

Much of the LOCCA method may seem new, but the framework is very much based on the integration of Louis' CFA and Ostrom's SES assessment. A couple things that stand out immediately include the Aggregate Community Capacity Grade (ACCG) and the Policy Capacity Grade (PCG). The CCL assessment from CFA uses partitions in calculating the weighted requirements. Similarily, the ACCG may easily be assigned by normalizing the requirements across each capacity factor and choosing the minimum (or worst capacity factor grade) to represent the ACCG. However, a corresponding weighting system might be necessary in capturing the holistic capacity of the respective Mandal or District. Thus, Ostrom's framework is more heavily used for the higher governance levels.

Furthermore, Bouabid (2004) provides a large database of existing technology alternatives as well as pre-assessed TCLs specifically for MSS; Henriques (2008) expands this database in his Thesis. However, similar work is yet to be done with widely accepted water policies and their corresponding Policy Capacity Grade (PCG). The PCG is a qualitative measure of a certain technology-related policy's level of difficulty and system considerations in adoption, operation, maintenance, and Maton's sense of ownership. For example, consider a technology-related policy to equip every rural habitation with a hand pump for every 500 people. For such a policy to be effective, each habitation must know how to operate and not abuse the handpump, a mechanic must be available either in the habitation or the respective Mandal that is able to maintain and repair the handpump, parts should be available for repair, groundwater should be available for access, and bore-well diggers can construct handpumps in each community. Considering these requirements against an aggregate community's capacity, one can say that this is a relatively easy water policy to adopt. The PCG thus is an indicator of how well a certain policy may be realized. As mentioned earlier, it falls beyond the scope of this thesis to categorize every domestic water-related policy available. However, three locally-accepted policies will be considered and discussed more in the concluding chapter.

5.1 **Requirements for the Modified-CFA at the Habitation Level**

This section briefly discusses each of the requirements in the modified-CFA (mod-CFA) that is employed at the habitation level. The mod-CFA adopts all of the original eight capacity factors. However, the requirements under each capacity factor are not necessarily the same. This section explores the impetus for deleting or adding the respective requirement in addition to providing general commentary on all of the requirements.

Note that each requirement is broken down into five partitions for scoring purposes. Given equal weight across all requirements within a CF, the CF's score is calculated. Much of the formulation is borrowed from Bouabid (2004) and Henriques (2008) in their expansion of the CFA methodology initially proposed by Louis and Bouabid (2004). In the below formulation, notice that the capacity score is represented by C_{ij} (with two subscripts). The first subscript (i) refers to the CF—from 1 through 8, in no particular order of importance. The second subscript (j) refers to the requirement under the i^{th} CF. Following the C_{ij} is w_j , which signifies the weight of that specific requirement. For the purpose of this thesis, it is assumed that the weights are equal (while this was discussed with the assisting engineers while scoring, it was decided that equal best to proceed with scoring first and that changing weights later on should be considered for sensitivity analysis purposes). However, it is important to note that the weight of a specific requirement must reflect the stakeholders' collective perceived rank respective to other requirements within a CF. As is the case with the nature of weights, they must all equal to 1. Finally the CF score is evaluated as shown in Eq.1.

$$f_i = \sum_{j=1}^n C_{ij} w_j \text{ for } n = 8, \qquad Eq. 1$$

Just as Bouabid (2004) and Henriques (2008) had followed the conservative rule for capacity matching, the HCCL score is determined to be the minimum of all of the community's respective CFs. However, all CFs will be compared against the technology's counterpart for evaluation of alternatives.

$$HCCL = \min(f_i), \quad Eq.2$$

5.1.1 Service capacity factor

The Service CF reflects on the current amount of service that the community is receiving. This serves as a benchmark for improvement such that any proposed alternative must at least meet the current service level, or is otherwise eliminated from recommendation. The current benchmark for service is split up into five partitions. Note that the partitions are based on the research from Henriques (2009).

4	a		~		
				community is currently receiving per head per day.	
1		. Der		apacity racion requirement – encetive service rever is the amount of water the	

Table 8: Service Canacity Factor requirement – affective service level is the amount of water the

1	Service Capac	Service Capacity								
C ₁₁	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	1			
f_1	Score Service Capacity					$\sum C_{ij} w_j$	1			

5.1.2 Institutional capacity factor

The Institutional CF reflects the organizational component of water service. In water distribution failure within a small habitation, there may be several causes that fall under the responsibility of an overseeing set of institutional bodies. The Institutional CF score addresses possible areas where institutional bodies may possibly fail, which may further lead to greater system failure. In our case, our system of interest is domestic water supply. As such the following requirements were identified under the Institutional CF.

2	Institutional Ca	pacity					w _j
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	0.1667
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	0.1667
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitatio- nal	0.1667
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	0.1667
C ₂₅	Governance	None	State	District	Mandal	Habitatio- nal	0.1667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	0.1667
f_2	Score Institutional Capacity					$\sum C_{2j} w_j$	1

 Table 9: Institutional Capacity Factor Requirements with particular perspective of Indian governmental structure, such that it may be used for Nalgonda.

The "Body of Legislation" refers to the officially recognized standards for drinking and domestic water supply in the area of interest. "Operational Rules" is a borrowed requirement from Ostrom's framework that reflects the institution's ability to meet system needs while controlling other subsystems, such as electricity. "Administrative agencies" refer to existing institutional bodies whose purpose is to meet the system's domestic water supply, quality, and management needs. "Administrative processes" is similar to "Operational Rules," except concerns inter-organizational collaboration. "Presence of NGOs" was another added requirement because of the prevalence of communication and investment between NGOs and existing institutional infrastructure. "Associated Regulation" was a requirement in the original CFA; however, it was removed for the purpose of decomposition into the existing and added requirements—it made sense that the regulation itself was delineated rather than be subjectively assessed.

5.1.3 Human Resources capacity factor

Human Resources CF reflects the social capital of the area of interest. Assessment of human resources is especially important because it concerns the turnover ability and general maintenance of its respective infrastructure. Further, beyond maintenance, the CF accounts for the existing population's own sense of the system. The proposed modified requirements for the Human Resources CF are presented in Table 10.

3	Human Res	ources Ca	pacity (ser	vice provider))		w _j
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	0.2
				Health Scientist	Health Scientist Engineer	Health Scientist Engineer Lawyer	
						Public relations manager	
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician Laboratory technician Water systems operator	Maintenance technician Laboratory technician Water systems operator Health inspector	Maintenance technician Laboratory technician Water systems operator Health inspector	0.2

Table 10: Human Resources Capacity Factors Requirements.

54

					Administrative assistant Water meter leader	Administrative assistant Water meter leader IT technician	
C ₃₃	Unskilled Labor	Craftsman	Clerk Mechanic assistant	Clerk Water meter reader Water systems worker			0.2
C ₃₄	Illiterate	Caretaker	Caretaker				0.2
C ₃₅	Access to Higher Education	None	State	Regional	District	Mandal	0.2
f_3	Score Human Resources Capacity					$\sum C_{3j} w_j$	1

Almost all of the requirements are from Henriques (2008) expansion of CFA. The "Access to Higher Education" requirement was added on upon commentary by community and institutional leaders—many felt that access to schools, libraries, or even professionals is equally as important as the existence of those respective resources themselves. An element of this is also presented in Ostrom's framework through the first-tier variables "Resource Units" and "Users", and the second-tier variables "Resource Mobility" and "Location." The requirement is partitioned by how far they would have to go in order to receive the benefits of resources available in higher educational institutions, with within the Mandal being the best possible scenario.

5.1.4 Technical Capacity Factor

When some of the stakeholders asked to define what technology may be, the answers were very interesting—nearly all of them were copied from a recent motivational movie called "3 Idiots." The professor prompts a student to answer the question, "what is a machine?" The protagonist of the film defines a machine as anything that human work

easier, comically talking about turning a tap or switching on fan. The professor in the class was rather looking for a more dictionary-oriented explanation. Ultimately, the protagonist's definition wins over the audience over the course of film. The response from the interviewed stakeholders turned out to be more towards the protagonist's, perhaps because they had seen the film. The Technology CF considers currently implemented technological solutions and whether they are achieving their purpose. Again borrowed from Bouabid, Henriques (2008) and supplemented by Ostrom (2007), the following requirements are proposed on the next page in Table 11.

Two important aspects of Technical Capacity become immediately obvious—the level of "Operations" and "Maintenance" that is required in order for sustainable use. Operations and maintenance requirements with respect to community assessment reflects a habitation's capability to fulfill the technological interactions necessary for the system to function and to maintain its critical components. Some communities might not be familiar with maintaining water storage reservoirs, while others may be fully versed in the remote control of water treatment and distribution plants.

4	Technical Capa	acity					w_j
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	0.2
				Control Water Quality	Control Water Quality	Control Water Quality	
					Control Pipes	Monitor pipes network Monitor Treatment	
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	0.2
			Minor repair	Major repair	Major repair	Check/maintain network	

Table 11: Technical Capacity Factor Requirements.

					Maintain pipes	Check/maintain meter Maintain IT systems	
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	0.2
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	0.2
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier District Approved	Habitational Supplier District Approved	0.2
f_4	Score Technical Capacity					$\sum C_{4j} w_j$	1

The two added requirements from Ostrom's framework are the respective networks for maintenance and water supply operations. In interviewing the Rural Water Services department in Nalgonda and its employees, it was deemed necessary that proximity to the habitation is exceedingly important for sustained functionality. In some cases, the water supply for a habitation came from over a 100km away and their awareness of possible water shortage was never communicated. In others, maintenance complaints regarding an improperly functioning groundwater pump motor went unanswered indefinitely—the habitation's citizens were forced to pool together to buy their own, effectively double taxing themselves for a single service.

5.1.5 Economic and Financial capacity factor

Economic and Financial CF reflects the community's economic capability of sustaining its own water infrastructural system. For many rural communities, this is very low—much of Nalgonda's primary economy is dependent on agriculture and mining, both are inherently dependent factor on water supply. In fact, as mentioned in Chapters 1 and 2, the government's primary method of solving the domestic water problem is through a large, centralized water distribution system with the primary objective of

delivering water for agriculture. Private investment, self-start ups, budgeting, etc. all make a big impact on how communities are able to access and receive water.

5	Economic an	d Finan	cial Capacit	у			Wj
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	0.14
C ₅₂	Market incentives	None	Low	Medium	High	Very high	0.14
C ₅₃	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	0.14
C ₅₄	Budget	None	Basic accounting	Annual	Tracked bi- annually	Tracked quarterly	0.14
C ₅₅	Asset values	None	Real Estate	Real estate Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks	0.14
C ₅₆	Investment activities	None	Low	Medium	High	Very High	0.14
C ₅₇	Loss to corruption	Very High	High	Medium	Low	None	0.14
f 5	Score Economic and Financial Capacity					$\sum C_{5j} w_j$	1

Table 12: Economic and Financial Capacity Factor Requirements.

This CF was one of the more modified CFs from the original due to several overlapping second-tier variables from Ostrom's framework. "Private sector investments" refer to large private-side investment at different governance levels. Since such investment has increased water service capacity historically by area, the partitions were broken down by region. Examples of private sector investment include agricultural bond for farms in any given area. Direct investments made by NGOs also constitute private sector investment. However, since such investment loses value due to bureaucracy, preference is given to localized investment. "Market incentives" and "investment activities" consider the idea of entrepreneurship and private market intervention. As such activities rise, so will the community's ability to afford and attract better personnel to maintain their infrastructure.

The financial requirements essentially indicate a community's capability to balance and take ownership of their respective budget and assets. "User fees" is a great requirement for understanding how communities value water while ensuring reinvestment for the future. A lack of fees encourages water abuse, while increasing block rates discourage water abuse and demonstrate the community's ability to monitor water usage. Finally, "corruption" was added due to the infamous amount of corruption not only in Nalgonda, but in general South Asia. Corruption disrupts the predictability of the functionality of any given system; thus, investment does not necessarily translate to results.

5.1.6 Energy capacity factor

The Energy CF is one of the most important measures for evaluating a community's capability to adapt to higher-level technological solutions. Given the type of "primary source," many electricity-orientated water technology-policy solutions may be eliminated. For example, in order to power a pump that extracts groundwater, a "3-phase" electricity line needs to service community. Some communities have this capability, others only have "2-phase" or "1-phase", all of which are levels of power being serviced on the line. Furthermore, given the nature of energy in the area, alternative sources or "alternative energy" is important to maintain service. The area is prone to outages; in fact, almost all areas expect no more than four to six hours of three-phase electricity, which is what is required for groundwater drawing. Thus, the "outage rate" is crucial in

assessing alternatives for increasing water service. Additionally, several areas do not have such electricity daily, or at all. The "Dependence" requirement evaluates whether the community's relies on external service to operate or maintain its respective energy infrastructure. For example, is there someone in the Mandal that may fix a blown fuse? The requirements chosen for evaluation are as follows in Table 13.

6	Energy Capa	ncity					W _j
C ₆₁	Primary source	None	Non- conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	0.25
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	0.25
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	0.25
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	0.25
f 6	Score Energy Capacity					$\sum C_{6j} w_j$	1

Table 13: Energy Capacity Factor Requirements.

5.1.7 Environmental and Ecological capacity factor

The Environmental and Ecological CF saw significant change from the original CFA, including from its original name "Environmental and Natural Resources" (Henriques 2008). Much of Ostrom's framework investigates how people interact when confronted limited resources. Though the Social-Cultural CF addresses general sociological and anthropological question, none of the other CFs particularly take on Ostrom's particular research question. As such, the mod-CFA recognized this need and expanded the Environmental and Ecological CF to include multiple requirements, such as the stakeholders' general awareness of their ecological system, the size of the natural resource system itself, and the predictability of those resources over the future. It made sense that when one drafts technology alternatives to improve water supply, the natural

resources are thoroughly investigated. While part of this may be captured in the Service CF, there is an inherent assumption that the ecological capacity is infinite. In an area with a large groundwater level decay rate as well as seasonal unpredictability, that assumption cannot be made. As such the following requirements in Table 12 must be evaluated.

7	Environmental and Ecological Capacity								
C ₇₁	Environment quality	Very low	Low	Medium	High	Very high	0.2		
C ₇₂	Size of resource system	Very low	Low	Medium	High	Very high	0.2		
C ₇₃	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	0.2		
C ₇₄	Growth or replacement rate	Very Negative	Negative	Stable	Positive	Very Positive	0.2		
C ₇₄	Resource sensibility	Very low	Low	Medium	High	Very High	0.2		
f 7	Score Environmental Capacity					$\sum C_{7j} w_j$	1		

Table 14: Environmental and Ecological Capacity Factor Requirements.

"Environment quality" evaluates the natural water quality as well as processed water quality. As mentioned earlier Chapter 1, water and sanitation are interrelated. The quality of water is function of the natural environment (such as the heavy abundance of fluoride mineral) and the processed environment (such as what people put back into or take out of the environment). "Size of resource system" addresses the upper limit of the expected amount water that can be drawn out of water sources—everything from rain to groundwater. While the rating is partitioned in levels of very low to very high, the selection of this dependent upon a combination of the physical levels of groundwater, surface water, and rain water availability.

"Predictability" is important because leaders need to be able to strategize shortfalls from any one source by relying on other sources. "Replacement rate" accounts for the heavy dependence on groundwater. Many habitations rely on groundwater for drinking water while others overuse it for irrigation purposes. Such activities need to be balanced for long-term usage. Finally, the "sensibility" requirement accounts for how much stakeholders may know about the finite amount of water—either by Müeller's definition of water scarcity (Müeller 2006) or just conventional usage relative to their partners. Per Ostrom's concern on a population's competitiveness becoming overbearing for the area's natural resources (2009), an evaluation of a community's sensibility of using water resources is important.

5.1.8 Social-Cultural Capacity

The Social-Cultural CF is incredibly relevant in assessing a community's capacity for a technology solution. While it may be easy to model institutional or technical resources, the social-cultural CF accounts for the heritage and current mood of the community. The following Table 13 shows the requirements for this CF.

8	Social and Cultural Capacity							
C ₈₁	Communal ownership	Very low	Low	Intermediate	High	Very high	0.2	
C ₈₂	Political stability	Very low	Low	Intermediate	High	Very high	0.2	
C ₈₃	Equity	Very low	Low	Intermediate	High	Very high	0.2	
C ₈₄	Leadership/entrepreneurship	Very low	Low	Intermediate	High	Very high	0.2	
C ₈₅	Participation of women	Very low	Low	Intermediate	High	Very high	0.2	
f_8	Score Social-Cultural Capacity					$\sum C_{ij} w_j$	1	

Table 15: Social and Cultural Capacity Factor Requirements.

"Communal ownership" evaluates an individual sense of shared resource and responsibility. While many feel entitled to the service, not everyone feels equally responsible for operating and maintaining that service. A shared feeling is essential for not abusing one's entitlement to a shared resource while giving, either financially or through personal work, towards the betterment of that resource. "Political stability" gauges the vulnerability of the provision of service to any specific community depending on that community's political beliefs or opponent's political beliefs. In Nalgonda, this is especially prevalent due to the attempted secession of the northwestern region of the state, called Telangana, from the rest of the state. This will be discussed more in a later section.

"Equity" is similar to communal ownership in the sense of shared resources; however, it additionally concerns a culture's treatment of an individual or family given their heritage. The Indian government introduced the idea of Scheduled Castes and Scheduled Tribes—essentially officially recognized lower castes and tribes of India—in order to address culturally imposed disadvantages. While the spirit of the practice is admirable, such economic and political disambiguation only intensifies segregation. In the end, such segregation becomes clear through corruption of services provided.

"Leadership and entrepreneurship" is an essential social-cultural requirement. Each habitation elects a Sarpanch, essentially a mayor. The mayor is the final authority on almost every single aspect in that habitation or Gram Panchayat. The Panchayati Raj, a council or senate of the Gram Panchayat may sway the Sarpanch's opinion, but functionally almost all progress depends on the Sarpanch's word. As such, a community's capability to take on projects usually falls to the leadership that it is under. Furthermore, entrepreneurial citizens or leaders are essential for dispatching heavy demands with limited resources. Finally, "women participation" is an accepted criterion worldwide for the level of social-cultural capacity.

5.2 Technology Capacity Level and Matching Rule

Assessing a community's capability to use a technology is not enough. It is imperative that the reverse is also performed. The Technology Capacity Level addresses this idea—in order for a community to use a technology effectively, there is minimum score of the capacity factors that the community must first meet. Just like a community, a technology is evaluated against each requirement to determine the minimal partition level that must be met in order for the technology to function appropriately. As mentioned earlier, Bouabid (2004) and Henriques (2008) use the conservative matching rule to ensure technologies that are catered to the communities' respective capabilities; as such the risk of system failure will be low. The rule is as follows:

> $HCCL \ge TCL \quad Eq. 3a$ $HCCL = \min(f_i) \quad and \quad TCL = \max(f_i) \quad Eq. 3b$

One may note that the rule may unnecessarily remove alternatives and is inconsiderate of the gradient in difference of values between the HCCL and TCL. Consider a hypothetical example where the HCCL of Community A is 55 and the HCCL of Community B is 40. Now consider Technology Alternative X with a TCL score of 56 and Technology Alternative Y with a TCL score of 70. It is difficult to ascertain that Alternative X is not a suitable or sustainable recommendation for Community A. However, it is possible to compare relatively; that is, the following statement is truer— Technology Alternative X has a lower chance of system failure if it were in implemented in Community A than Community B. Similarly, Technology Alternative X would be a better recommendation than Technology Alternative Y for Community A, even though both alternatives do not meet the above matching rule. Such comparisons become valuable given the complexity of the model. Furthermore, such comparative analysis provides a better foundation of trust in following through with the recommendation of an alternative. In the original context, Bouabid (2004) used this matching rule eliminate in the respective quintile partitions rather than a strict score. That is another method to perceive this model.

Therefore, given the variability of the model, it makes sense to consider a set of practical technologies by each CF and thereby evaluate overall relative risk of system failure. The original intention of the rule was to act as a filter for the large array of technology alternatives that were compiled by Bouabid (2004). However, for the purpose of this thesis and verification of the established model, only a small set of technology alternatives (who fit the broad categories of different TCL partitions) were evaluated. Once a technology's TCL score has been evaluated, which is done in the next chapter, the set of technology alternatives' scores are compared against the HCCL in radar graph. The graph provides a visual measure of understanding possible shortcomings of an alternative if it were implemented in a community.

5.3 Aggregate Community Capacity Assessment

Once a habitation is assessed for its ability to use a technology solution, it becomes imperative to aggregate and extrapolate such information to policy makers at higher governance levels. However, averages, modes, or medians of the HCCLs do not suffice or qualify as fulfilling proper assessment of an entire Mandal or District. Since Ostrom's framework is strong in providing comprehensive and qualitative analysis given initial low-level assessment, the LOCCA method emphasizes Ostrom's 1st-tier general variables to complement the HCCL data. As shown in Figure 17, Ostrom essentially outlines major subsystems' interactions. She outlines two main variables, Governance System and Users, where policies may impact the outcome of an integrated system. Ostrom also delineates the Resource System and the Resource Units as the states of the system, prone to change per policy actions and interactions with other systems. Furthermore, Ostrom assumes that the Social, Economic, and Political Settings as well as Related Ecosystems (such as the Agro economy) influence the state variables and policies, yet they are outside of decision control.

In order to assess a Mandal's or District's Aggregate Community Capacity Grade (ACCG), which is defined as the community's ability to adapt to that policy, one must combine the HCCL data and Ostrom's general assessment. In doing so, one must first establish standards for each ACCG level such that they may directly translate to policy. The following ACCG letter grades and their corresponding characteristics across Louis' CFs are proposed. The ACCG for that entire Mandal or District is then assessed by considering the qualitative grade that best represents all of that Mandal or District's lower ACCGs.

Table 16: Aggregate Community Capacity Grade Characteristics across Risk Factors.

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

5.4 **Policy Capacity Grade and Matching Communities with Policies**

Similar to the Technology Capacity Level (TCL), a Policy Capacity Grade (PCG) is assessed for each policy that is considered for recommendation. While the policies vary from educational to infrastructural to technological to institutional, the ACCG characteristics chart shown in Table 16 provide a comprehensive assessment of an aggregate's community to be able to adapt to such policies. For example, consider recommending a water-related policy that serves to provide Comprehensive Protected Water Supply Service, which has certain requirements as low energy outage and high maintenance, to a rural Mandal without proper energy infrastructure or human resources. Without proper resources, such a policy is doomed to failure and will have heavy financial and political repercussions.

As with the TCL, different policies will be compared against a community's ACCG across the risk factors highlighted in Table 16. Unlike the TCL, however, the PCG is not evaluated as the minimum grade from the set of all CF grades, but rather a qualitative average. The primary impetus behind this assertion is to allow for the qualitative assessment to supplement the quantitative assessment provided by mod-CFA; secondarily, the PCG comparison is intended to act as an information-sharing activity that meets the participatory and intra-institutional requirements. Thus, a minimizing function on partitions would not make sense. It is suggested in the concluding chapter that in the future, the foundation for how such a qualitative score may be further investigated. However, for the purposes of this thesis, the characteristic groundwork outlined in Table 16 provides enough means for policy matching. Furthermore, it should

be noted that only a few policies that reflected current capability were selected for consideration. The PCGs of the policies are calculated in a subsequent chapter.

Finally, Henriques' (2008) matching policy for CFA can be modified for generality purposes and be adapted to policy matching in the following manner:

$$ACCG \gtrsim PCG \quad Eq.4$$

This rule ensures that any recommended policies are capable for immediate implementation. During the site visit, several stakeholders commented on officials that sought unrealistic goals and were essentially voted for their sensationalism rather than practicality. While it is important to have a long-term vision, inability to follow through short-term measures inhibits future performance. Furthermore, adopting a better policy alternative that is catered to the Mandal or District is hypothesized to subsequently increase the respective ACCG of the Mandal or District. To prove this hypothesis, however, requires a long-term longitudinal study and is listed as an item for future work.

5.5 Ranking Strategies for Technologies and Policies

After deriving a set of acceptable technologies and policies, they are ranked for recommendation to the stakeholders for implementation. The primary product of this thesis is an assessment of a community's capacity to adopt a technological solution, and it is assumed that any set of alternatives that meets the community's capacity level is appropriate for implementation. Given that a set of alternatives is eligible for implementation, they are ranked by estimated Service benefit that they will provide to the community. Cost is another major player for choosing among the alternatives; however, several existing frameworks address how cost evaluation should impact alternative recommendation.

5.6 Implementation Timeline of Chosen Alternatives

This section provides a brief commentary on the implementation timeline of the chosen alternatives. Upon assessment of lower-level communities, such as individual habitations and Gram Panchayats, the turnaround time for technological alternative recommendation may vary from one to three months. However, assessment at higher governance levels takes a much longer time. From Figure 20, it is easy to see that much of policy approval depends on the success of implementation of lower governance levels. While the policy matching process may start immediately after constituent HCCLs are evaluated, the implementation of a policy depends on the success on recommended alternatives. As such, the implementation timeline for policies varies from one to three years, depending on how quickly constituent habitations show results. The validation timeline for this framework falls to a longitudinal study that may befit a doctoral dissertation.

Chapter 6: Technology and Policy Alternative Capacity Assessment

Chapter 6 investigates a set of technology and policy alternatives and their minimal requirements necessary for implementation into a community. As aforementioned, the technology alternatives are chosen from the set of existing technology solutions in the region and the policy alternatives are chosen correspondingly from the District and State's activities. Expert feedback from department heads in Nalgonda is the primary information used to calculate the TCLs and evaluate the PCGs. Specifically, after receiving permission from District Collectorate Indian Administrative Service (IAS) Officer S.A.M. Rizvi and Superintending Engineer (SE), B. Jagadishwar Reddy, Personal Assistant to SE Kandikuri Suresh and Executive Engineer (EE) D. Venkataswarulu. Additional information from on-site engineers and mechanics were used to modify the scores as reflected.

6.1 Technology Alternative Capacity Level Assessment

The set of technology alternatives that were chosen for evaluation are outlined here:

- Comprehensive Protected Water Supply Scheme (CPWSS) a surface watersourced, centralized filtration and distribution system aimed to service large areas at once.
- Protected Water Supply Scheme (PWSS) a groundwater-sourced, defluoridation optional, distribution system aimed to service a Gram Panchayat.

 Rainwater Harvesting Schemes (RHS) – roof-based or man-made rainwater collection-based sourcing, carbon-based filtration, aimed to service from a family scale to a small village.

6.1.1 Comprehensive protected water supply scheme TCL

Figure 21: Portion of the AMR Project model. Note that the water is provided via canal from the main surface water source at the Nagarjuna Sagar Dam. That water is transported via canal for irrigation projects and via pipe for drinking water supply.

CPWSS is a modern, centralized water treatment and distribution service. In context with Nalgonda, CPWS is provided through one main water source—the Nagarjuna Sagar Dam of the Krishna River. Water is taken in from an entry point in the southwestern tip of Nalgonda in Puthangadi and lifted 150 meters via pump to a balancing reservoir in Akkampally. From there, the water is transported via canal for both irrigation and domestic usage. The domestic water intakes along the North-South canal lead to large-scale water treatment facilities. Water is treated for bio-contaminants, pathogens, minerals, and general suspended solids. The treated water is then distributed to storage reservoirs in surrounding Mandals and Gram Panchayats. The distribution channel to the storage reservoirs is gravity-fed; however, the distribution channel pipes are not always secured underground or the contractors may not always build to design requirements. The CPWSS system is reviewed primarily by the AMR scheme, an overview of which is shown in Figure 21. The TCL and PCG of CPWSS were conducted together. Since it is a large scale implementation costing crores of rupees, it acts as a policy initiative by the government. The evaluation was primarily conducted with Kandukuri Suresh and respective visits to branch offices of RWS in different Mandals. The summary is presented below in Figure 22. The full evaluation is presented in Appendix II.

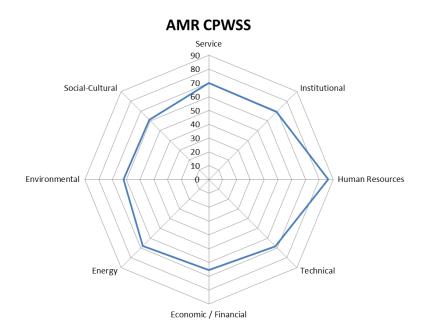


Figure 22: Graph of AMR CPWSS' Technology Capacity Level.

6.1.2 Protected water supply scheme TCL



Figure 23: A PWSS in construction nearby Mothkur. Almost all PWSS pump water up to an overhead reservoir to supply water via gravity to nearby households, or villages if the PWSS is a larger variety.

PWSS serve either a portion of a large village, a medium-sized village, or a pair of small villages. It pumps groundwater to an overhead reservoir either daily or every other day depending on availability of electricity. It is up to the community to clean the tanks every other week via bleach or chlorination to prevent pathogen growth; however, this is not usually done. The main advantage of this technology is that it is easily replicable; however it depends heavily on groundwater and electricity. Thus, fluoride becomes a problem, as well as access to high-voltage electricity without many outages. The TCL associated with PWSS is perceived as the technology uptake associated with installing a new PWSS in a community. A picture of a typical PWSS is presented in

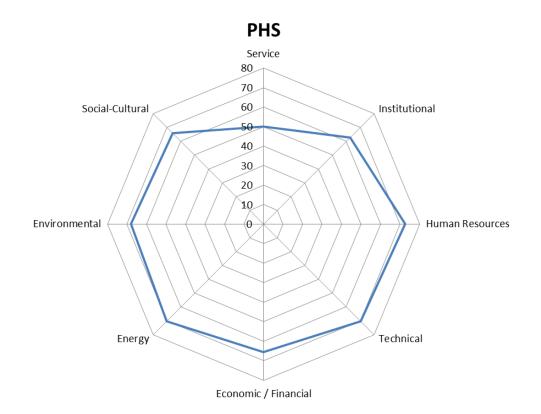


Figure 23. The summary of its TCL is presented below in Figure 24, the full scores available in Appendix II.

Figure 24: Technology Capacity Level of PWSS.

6.1.3 Rainwater harvesting scheme (RHS) TCL

RHS serves families in a village. Typical rainwater harvesting systems are roofbased, meaning that the rain falling upon the roof of house is collected in a separate tank, then filtered before use. Other systems in the area include groundwater collection schemes within an household and at a communal level. Outside the house and within a family's plot, the family may lay stone flooring instead of keeping a dirt lawn to collect the water towards a ground-level water storage reservoir. The water is kept inside over the course of the year and used as needed for primarily domestic purposes. A typical 8mx8m house is able to generate an average of over 100 liter per day in the region. Other schemes that are more communal based also exist, such as the Oorani scheme. The Oorani scheme creates a man-made open reservoir between a small set of villages and creates pathways for water collection. Its natural dip collects water over the course of the year more easily than at a household level as it takes advantage of a greater geographic expanse. Nearby villagers than collect the water through hand pump set up by the reservoir that contains a filtration system within them. While these schemes can collect more water, they are also susceptible to greater evaporation rates. However, these schemes have filled the gap for localized water supply infrastructure for incredibly rural areas in place of centralized water supply solutions such as the AMR project.

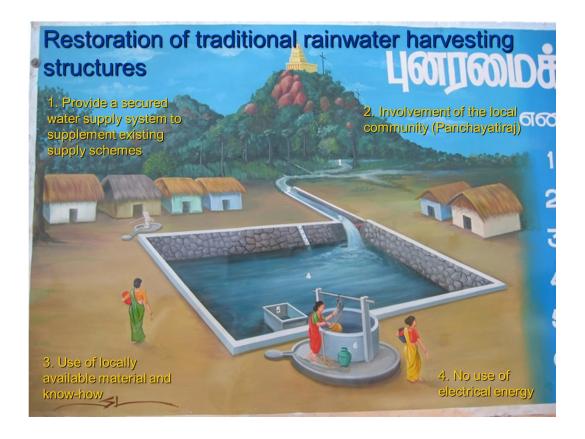


Figure 25: Oorani Scheme as presented by visiting faculty from Anna University (Walther 2009).

The Oorani schemes are still very new and thus the engineers were hesitant about guessing at its TCL. However, they were able to provide feedback on rainwater

harvesting schemes at large. With the help of NGOs, four villages implemented roofbased rainwater harvesting schemes. Furthermore, one Oorani schemes is already seeing water being collected in its respective ecosystem. Given this set of experiences, the TCL of rainwater harvesting systems is calculated, and Figure 26 below presents a summary.

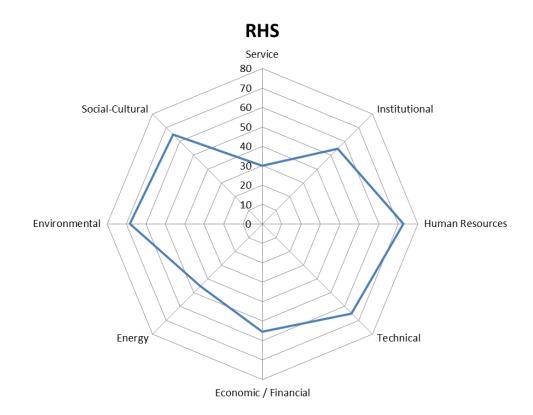


Figure 26: Technology Capacity Level of RHS.

6.2 Policy Capacity Grade Level Assessment

After considering the local technology options, three associated "water policies" were also investigated. The first policy is the expansion of and installation of additional CPWSS. By far, this is the costliest policy; however, this is also a policy to which the World Bank could lend. The second policy is the proliferation of PWSS. Proliferation of these facilities includes building these sites in areas without any, or with limited water supply as well as providing the operation and maintenance infrastructure associated with the technology. This policy includes the smaller governance levels in contributing to operational costs, but requires financial injection from the State or District levels. Finally, the third policy is the proliferation of RHS. Though these schemes are new, they are comparatively cheap to support. Furthermore, tax-breaks could be provided to local businesses that lend their support to the construction and contribution of RHS in their respective communities. However, these schemes are very difficult to regulate and may fail if not followed through with properly. The details of these policies are discussed below.

Before speaking specifically of each of the below policies, the current policies of building, operation, and maintenance of rural water supply systems should be reviewed. In 2007, the Government of Andhra Pradesh issued Government Order Ms. No. 569 (GO. 569) to further specify responsibilities and allocate funds to the Panchayat Raj institutions, which were officially state-recognized through Indian Constitution's 73rd Amendment. Formally, GO. 569 references that: "73rd Amendments Act has provided for the devolution of powers and responsibilities to Panchayat Raj Institutions to enable them to function as Institutions of Self-government with respect to:

- a) The preparation of plans for economic development and social justice.
- b) The implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule."
- Andhra Pradesh GO. 569 in reference to 73rd Amendments Act of India

The Eleventh Schedule that is referred to in the above excerpt includes responsibility over multiple services that span from water, sanitation, education, animal husbandry, agriculture, rural housing, etc. Amongst them is the delineated item of "drinking water." In referencing the federal constitutional amendment, this government order is essentially placing the massive responsibility of managing the rural water supply to the Panchayat Raj institutions. Furthermore, GO. 569 decrees that:

"The Government after careful consideration of recommendations of the Task Force hereby devolve the following functions to Panchayat Raj Institutions in respect of Rural Water Supply Department:

- Maintenance of Rural Water Supply Schemes with assistance of Rural Water Supply Engineering Department.
- Participation of planning for new drinking water schemes.
- Promotion of Household Connections.
- Creating awareness through Training Programs, Seminars and IEC activities on Health Hygiene and Safe Drinking Water.
- Review the water testing reports and Monitor the Quality of Drinking Water.
- Planning, Implementation, and Monitoring of Total Sanitation Programme."

	Distribution of Functions and funds			
Activity	Zilla [District] Parishad	Mandal Parishad	Gram Panchayat	
Activity Development of water supply system (Annual allocation Rs. 132 Crores [\$24M])	 Participation in planning of CPWS scheme. Maintenance of CPWS Schemes/Multi-Village Schemes (MVS) (Annual allocation of Rs. 55 crores [~\$10M] Review the water testing reports and Monitor the Quality of Drinking Water. Arrange Training Programmes, Seminars and IEC activities on Health, Hygiene and Safe Drinking Water Review the activities of District Water and Sanitation Mission 	 Participation in planning of water supply schemes covering more than one Gram Panchayat. Review and Monitor the maintenance of Hand pumps, PWS Schemes, and distribution of grant as per planning (Annual allocation of Rs. 14 crores [\$2.6M]) Providing and entrustment of Transportation and hiring of wells for Drinking Water. Review the water testing reports and Monitor the Quality of Drinking Water. 	 Identify schemes and locations, through the involvement of Gram Sabha and GP. Operation and Maintenance of single-village schemes (Annual allocation of Rs. 63 crores [\$11.5M]) Regular chlorination of open wells and treat water and cleaning of OHSR. Ensure proper distribution of water to all locations of households in its villages. Monitoring and surveillance of quality of water Take up the works relating to laying of pipelines for drinking water supply in the village Promote Household connections. Formation of Water and Sanitation Committee 	
Rural Sanitation	 Planning, entrustment, monitoring and coordination of Rural Sanitation Programmes. Approve the action plans on Total Sanitation submitted by the MPS. (annual allocation Rs. 178 crores [\$32.4M]) Providing Technical support for implementation of Total Sanitation 	 Organizing awareness campaigns on Total Sanitation in the villages. Consolidate the action plans of the Gram Panchayats and integrate with Mandal Parishad plans and submit to the ZP. Coordination and supervision of implementation of Total Sanitation Programme Providing Technical support for implementation of Total Sanitation to GPs. 	 and levy and collect the user charges. 1.Prepare an action plan for Total Sanitation of the Gram Panchayat and submit to the MP 2.Implement the Total Sanitation in the GP 3.Undertake Sweeping of the Streets, construction and Cleaning of drains, disposal of solid-waste, Construction of ISLs, Waste Water disposals, Construction and maintenance of flat forms for DW sources and soakage puts, Providing dumping yards, creation of awareness on Health and Hygiene among the villages. 	

Table 17: Annexure to GO. 569 Issued on December 22, 2007 describing the responsibilities of each institutional level.

All monetary allocations in Table 17 are updated by new legislation. While the scope of this thesis is on domestic water (primarily drinking water), both water and sanitation were included in the table to present a picture of dual responsibility of the District, Mandal leadership, and Gram Sabha.

6.2.1 Comprehensive protected water supply scheme PCG

CPWSS is typically a State-level policy since it impacts multiple Districts in a watershed. Even with the AMR Project, the scheme impacts the District of Nalgonda and the capital city of Hyderabad, where five million citizens are predicted to be serviced. The treated drinking water supply primarily goes to the city, excepting the treated water from three distribution facilities. The AMR project is predicted to cost Rs. 1260 crores, or nearly \$230M, as shown by the Government of Andhra Pradesh's Water Resource Information System. While GO. 569 states that Zillas (or Districts) must participate in the planning of CPWS schemes like the AMR project, their participation typically ends up being an afterthought. Engineers at the state level draw up the design of the CPWSS and the design is then submitted to RWS in Nalgonda for inspection and sign-off. This is not a participatory process, much rather an intra-institutional collaboration as the spirit of the GO. 569 dictates.

Furthermore, the human resources necessary to operate and maintain a CPWSS is just as one notch above PWSS, in the sense that operators must be constantly aware that their respective portion of the system is a node in a larger network. This systemic methodology is not easy to come by, especially in rural areas where the water has both domestic and agro-economic value. Suresh comments that the RWS department typically finds "water hijackers" along the pipeline routes; these breaks in line cause severe loss in water head and thus poorer supply down the line (2010). Thus, workers different at nodes in the CPWSS should be knowledgeable of how to operate and maintain their respective pipelines to address these issues as they arise.

Venkataswarulu and Suresh both acknowledge that in general any community being serviced by a CPWSS system "does not need to be perfect, but know what they have" (2010). As such they recommend a higher-level threshold on the rest of the factors. Given this commentary, corresponding research, and the qualitative metrics shown in Table 16, the PCG is deduced and summarized in Table 18 at the end of this section.

6.2.2 Proliferation of protected water supply schemes PCG

While fluoride and groundwater depletion remain significant challenges with regards to PWSS, both Suresh and Venkataswarulu comment that this may be one of the easier options to follow. Since the installation of a PWSS is a one-time investment with minimal operational cost (assuming the pump does not breakdown), the PWSS is one of a cheaper option as well. Otherwise, the responsibilities of operation and maintenance, which includes cleaning the tank every other week, remains with the Gram Panchayat. The success of these systems typically depends on the leadership, as will be demonstrated during the case study. PWS schemes also pair well with local entrepreneurs that build defluoridation plants to remove the mineral from the water. However, this entrepreneurship is not systemic.

Finally, this option is easily replicable in terms of ease of adoption of policy since construction plans and construction partners already exist. However, its impact on groundwater cannot be easily ignored. The PCG for PWSS is summarized in Table 18.

6.2.3 Proliferation of rainwater harvesting schemes PCG

Finally, the proliferation of RHS is another option. This is the cheapest option to the state and the district because it places the burden of financial start-up typically on a family or village. Maton (2008) speaks about the order of empowerment; he suggests that the individual is an easier starting point rather than an automatic installation of culture. With this in mind, the RHS falls more along the lines of individual operation and maintenance. The biggest challenge with RHS remains its replicability; there have been many different implementations of RHS across Nalgonda, with systemic success in a few habitations. Otherwise, some households were found to have implemented their own catchment system, seemingly by preference rather than a communal push. The variations include roof-based systems and open-well catchment. For the purposes of scope, the Suresh and Venkataswarulu suggested considering roof-based systems and the Oorani system. They noted that the policies were similar, excepting a greater investment from either the Mandal or District level to create an Oorani system that may end up acting as a MVS. Roof-based systems were considered for the PCG and the results are summarized in Table 18 below.

	Policy Capacity Grade		
Factor	CPWSS	Pro PWSS	Pro RHS
Institutional	Α	В	В
Human Resources	А	В	С
Technical	В	В	С
Economic and Financial	В	С	В
Energy	В	В	D
Environmental and Ecological	В	В	В
Social and Cultural	В	В	В
~ <i>PCG</i>	A/B	В	B/C

Table 18: Policy Capacity Grade Summary Table of CPWSS, Proliferation of PWSS, Proliferation of RHS.

Chapter 7: Results of Capacity Assessment in Nalgonda

Thus far, the overview of LOCCA methodology and its respective assessment of three technologies and their associated policies were considered. This chapter presents the results of capacity assessment from multiple habitations, corresponding Gram Panchayats, and corresponding Mandals in Nalgonda. Much of the technology-side capacity assessment was performed in the main RWS office in Nalgonda; however, it is impossible to assess individual communities from looking at numbers on a desk. As such, the author pursued an on-site study with the accompaniment of Suresh on majority of site visits or with a local leader, either an officer or hand pump mechanic that may be more familiar with the particular community, of the RWS department.

The site visits originally included visiting 38 Gram Panchayats (GP) across 20 Mandals. However, not all GP visits produced enough information necessary to conduct a reliable capacity assessment of the area. Thus, the assessment was only conducted for the 33 Gram Panchayats, including four officially designated as "municipalities", an institutional grouping of the less rural GPs, across 16 Mandals. The summary of each GP visited, their corresponding Mandal, and the RWS or Panchayati Raj leaders that accompanied the visit are listed in Table 19. A summary graph of the visited areas is also provided in Figure 27.

The site visits were conducted Monday through Saturday while officers of different RWS offices, GP leadership, and Mandal leadership were available. A typical visit consisted of meeting with the respective Sarpanch of the GP as well as fellow leaders in the GP, surveying their primary source of domestic water supply, whether it was a CPWSS, PWSS, or RHS, and asking questions about current means of operation and maintenance. In addition, general questions about the village dynamics, habits, and plans were also asked. Much of these visits were videotaped with consent for the purpose of retaining information since writing in front of others and not looking at others' eyes during a conversation is considered cultural taboo. Though the author led in asking most of the questions, he was helped by the RWS department co-visitor. Finally, in certain cases the author was asked to help in terms of basic engineering knowledge (a complaint of a broken pump and a complaint of a corrupt Sarpanch); however, no physical or monetary aid was provided beyond relaying the complaint to RWS.

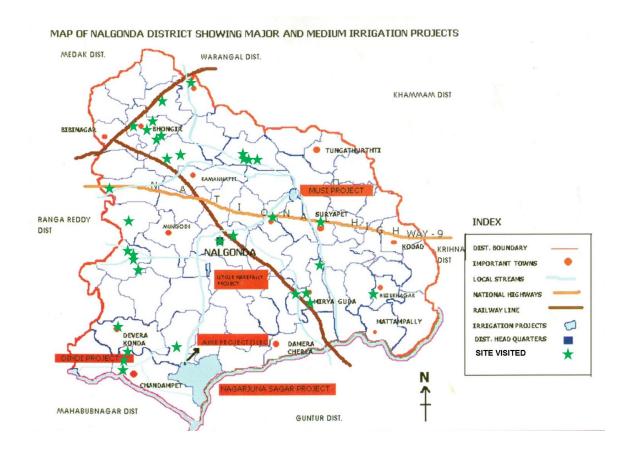


Figure 27: The green stars note the locations that were assessed. Since the area has not yet been surveyed and recorded with GIS, the locations are overlaid by an available map. While more sites were visited, only sites that were assessed are displayed here. Map provided by the Water Resource Information System (2004).

Table 19: Gram Panchayats visited, corresponding Mandal, and name and title of primary contact. DE denotes Deputy (Executive) Engineer, AEE denotes Assistant Executive Engineer, VDO denotes Village Development Officer.

Mandal	Gram Panchayats	Contact name
Bhongir	Bhongir M, Banda Somaram, Kesaram, Raigir, Ramachandrapur	DE Dasyam Laxman
Chandempet	Neradugommu, Polepally, Timmapuram	Timmapuram Sarpanch: Pappayya, Narsimha (Handpump mechanic)
Choutuppal	Choutuppal	AEE G. Indrasena Reddy
Devarkonda	Deverkonda	DE K. Hamsaram Rao, Lakshmachari (Pump Mechanic)
Huzurnagar	Huzurnagar	DE Venkat Reddy, AE K. Brahmam Babu
Marriguda	Batlapally (Vattipally), Marriguda, Shivannaguda, Anthampeta	A. Sathya, Yaddaya (Hand pump mechanics); Dikshapathi, Vothi Kata Yellaya, Dabha Narsimha; VDO Laxman Nayak
Miryalaguda	Miryalaguda M, Venkatadripallam, Zapthiveeragudem, Chinthapally	Municipal Engineer: Venkataswarulu, Town Planning Officer: Rahul R, Municipal Chairman: Rosaiah; Pump Mechanic Ch. Venkatashwarlu, Constable/Filter Plant owner Sudhaker Reddy
Mothkur	Anjipuram, Bujalipuram, Dharmapur, Mothkur	Guram Lakshmi Narshimha Reddy
Nakrekal	Nakrekal	Madhushudharn (Section Officer)
Nalgonda	Nalgonda M, Panagal	AEE Kandukuri Suresh
Narayanpur	Vaillapally	DE Seetha Ram Reddy
P.A.Pally	Chilkamarry	Venkatasham (Hand pump mechanic)
Suryapet Valigonda	Suryapet M Valigonda, Sunkishala	Municipal Chairman: Meela Satyanarayana (also Founder and Managing Director of Sudhaker Group of Companies) Mandal Parishad Development Officer: K. Janaki Reddy
Yadagirigutta	Yadagirigutta	GP Secretary M.A. Salim
Alair	Alair	AEE Sreedhar Reddy

In the next section, a summary of the capacity assessment is conducted for each GP in a Mandal and an aggregate capacity grade is then issued to that respective Mandal. The full capacity assessment of each GP is provided in Appendix IV and the tables for the ACCG for each Mandal are provided in Appendix V.

7.1 Capacity Assessment by Mandal

7.1.1 Bhongir Mandal

Bhongir is one of the more populated Mandals in Nalgonda. It is a major commercial center due to its location along two major highways. The most recent surveys indicate that Bhongir is fully covered, that is that it meets the minimum 40 lpcd requirement for all of its respective villages that add up to a total population of nearly 50,000. Despite these statistics, the subjective feedback from the RWS department and local people indicate that it still struggles due to high reliance on groundwater. Deputy Engineer (DE) Laxman notes 80% of the Bhongir Subdivision of RWS is covered by defluoridation plants to remove the fluoride mineral from the groundwater. While supply and quality is not an issue due to the technology currently in place, the demand has risen dramatically from the originally anticipated amount of 40 lpcd to around 80 lpcd. He attributes this to use of water beyond domestic uses, such as diverting water for cattle.

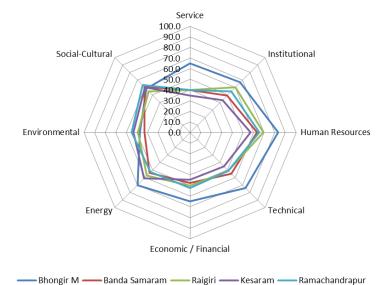


Figure 28: Speaking with Laxman in Bhongir RWS Office.

Figure 29: Failed rainwater harvesting scheme in Raigiri Primary School.

According to Laxman, the biggest problem is socio-cultural. The ownership level of most communities is "zero. A big zero" (2010), specifying the monetary commitment that each household should pat but isn't, and noting that the funds are barely enough to

cover salaries of the operator. He infers that this is what causes the very slow turnaround on repairs of any system breakdown, even though the Mandal is technically fully covered. Furthermore, he highlights the reliance on electricity and defluoridation plants, which he says are a "terrible waste of water," with over 60% removed as sludge. Laxman said that there could be hope with rain water, and referred to a failed experiment with rainwater harvesting in a primary school in Raigiri shown in Figure 29. The summary graph of GP Capacity in Bhongir Mandal is shown in Figure 30. As can be anticipated, the Bhongir municipality itself fares better than the more rurally distributed GPs. The most varying factors seems to be Human Resources, Institutional, and Technical, while the most commonly scored factors seem to be Social-cultural and Environmental.



Bhongir Mandal GPs

Figure 30: Capacity levels of GPS visited in the Bhongir Mandal.

With this information, it is possible to arrive at a general aggregate capacity score for Bhongir. The comments from the interview and the notes from the visit point to the fact that social-cultural and technical may be the two of the more limiting factors. Moreover, the institutional setting is also generalized over the Mandal typically. Considering the additional factors from Ostrom's framework, the Bhongir Mandal receives an ACCG of B, indicating that it is substantial enough to receive higher capacity system like PWSS, which the area currently relies on, but may struggle with managing a centralized distribution system like CPWSS. The summary is shown in Table x.

Factor	Bhongir
Institutional	В
Human Resources	С
Technical	В
Economic / Financial	В
Energy	В
Environmental	С
Social-Cultural	В
~ACCG	В

Table 20: Aggregate Community Capacity Grade for Bhongir Mandal.

7.1.2 Alair Mandal

The Alair Mandal is located north of Bhongir. AEE Sreedhar Reddy provided the guided site visit to the GP of Alair in the Alair Mandal, commenting that much of the Mandal is like the GP of Alair. Alair is small and monotonous. It currently uses PWSS, and in most cases the area uses defluoridation plants much like Bhongir. Of the 34 habitations in Alair, only 12 are fully covered; 7 are anticipated to be fully covered in 2015. Alair is one of the few Mandals with a large number of habitations (6) categorized as receiving non-safe sources of water. This indicates the presence of above safe levels of fluoride in the groundwater and the lack of a defluoridation plant to remove the mineral in those respective villages.

To curb the fluoride problem in the Mandal, there is a current proposal to expand the CPWSS from Nalgonda Mandal to Alair Mandal through Mothkur Mandal. The project costs Rs. 50 crores, or roughly \$9.2M. This would bring great relief of drinking water supply to the area. Reddy comments, however, that the drawback of such a system may not necessarily be the supply within the Mandal, but the lack of predictability associated with supply line failures. Additionally, if Alair follows suit with other Mandals that have received CPWSS, there will be a rise in water demand, further aggravating the water scarcity situation in the area. The summary graph and table are provided below.

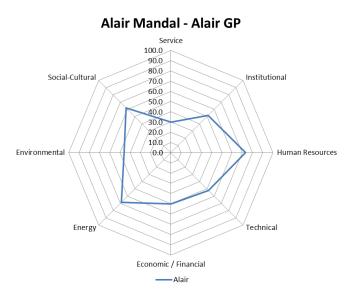


Figure 31: Community capacity assessment of Alair GP.

The three most limiting factors in Alair are institutional, social-cultural, and technical. Furthermore, the service itself is much lower than the minimum of 40 lpcd. As such, solutions should be introduced that attempt to raise this service level while accounting for the risk factors, such as poor predictability, operation and management of resources, and operational rules. Table 21 summarizes the aggregate capacity grade.

Factor	Alair
Institutional	С
Human Resources	С
Technical	С
Economic / Financial	В
Energy	В
Environmental	С
Social-Cultural	В
~ACCG	С

Table 21: Aggregate community capacity grade of Alair Mandal.

7.1.3 Yadagirigutta Mandal

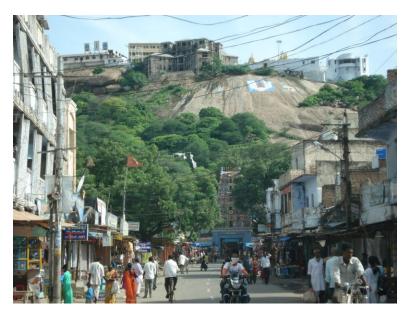


Figure 32: Approaching Sri Lakshiminarasimha Swamy Temple in Yadagirigutta. This major religious destination helps to local economy as well as provides for self-investment for water and sanitation services.

The Gram Panchayat Secretary, M. A. Salim, of Yadagirigutta of Yadagirigutta Mandal, was the primary contact during the site visit. It is located east of Alair. This Mandal has 17 habitations with access to non-safe sources of domestic water supply, the most of any Mandal in Nalgonda. According to Salim, the water supply itself is not the problem; rather water quality is the challenge. The Mandal uses reverse osmosis to extract the water from the mineral and then supplies it via household connections to as many villages as possible. The carbon filters of the filters are replaced by local personnel every 15 days. Each such RO plant costs Rs. 4.5 lakhs or about \$83,000, with an additional Rs.30,000 per month or \$550 for maintenance. While these costs can add up quickly, the area has become an economic hot spot due to a major religious temple in the Yadagirigutta GP. The Sri Lakshminarayana Swamy draws people from the entire State of Andhra Pradesh, helping the local economy. Households pay towards cans of water and are thus able to contribute to nearly two-thirds of the operational costs. At the same time, these fluctuations in current population in Yadagirigutta present a challenge in drinking water demand and management.

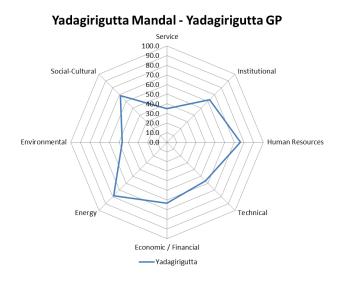


Figure 33: Community capacity assessment of Yadagirigutta GP.

The Sri Lakshminarayana Swamy Temple helped draw political support to the area, which aided with a slightly better energy infrastructure than typical rural Mandals. Tourists typically hail from urban areas, and the Mandal and District leadership works hard to accommodate them accordingly with electricity almost all day. However, one byproduct of the heavy demand in the area is the environmental impact. According to Salim, NGOs have started cropping to address this and related problems in the area. Figure 33 shows the community capacity assessment of Yadagirigutta. Lastly, it should be noted that the GP Secretary is Muslim in predominantly Hindu area, and this can be taken as a sign of perceived equity.

As with Alair, Yadagirigutta Mandal is scheduled to receive CPWSS water. Meanwhile, the benefits afforded to Yadagirigutta because of the presence of the temple are extended across the Mandal. While some of these villages still suffer, as demonstrated by the 17 without access to safe sources of drinking water, the greater economy has been undercutting the problem by means of physical water transportation. The residual benefits of the better economy are thus wide. Its aggregate capacity is summarized below.

Factor	Yadagirigutta
Institutional	В
Human Resources	В
Technical	С
Economic / Financial	В
Energy	А
Environmental	В
Social-Cultural	В
~ACCG	В

Table 22: Aggregate community capacity demand of Yadagirigutta Mandal.

7.1.4 Voligonda Mandal

Next, the Mandal from where the author had originally hailed from is considered. Voligonda Mandal is south of Bhongir and is home to nearly 70,000 people. The Mandal is almost all fully covered; 67 habitations are fully covered and the remaining 25 are expected to be fully covered by 2015. The water for Voligonda comes from a mixture of borewells and an extended pipe from the Musi CPWSS. The Musi CPWSS is a newer CPWSS similar to the AMR Project. It pumps water from the nearby Musi River, which passes south of Voligonda, to a reservoir where it is treated and then distributed via gravity to nearby habitations. This CPWSS has been a half-way system between extending the AMR Project lines and installing more PWSSs.



Figure 34: View from the hill that houses the water tower that provides water to Voligonda GP and further. The town shown surrounded by agricultural farms is Voligonda.

Voligonda has started coming into the spotlight recently after the building of a temple, an engineering college, and a secondary school by the same person that originally sponsored this summer research trip, Dr. Pailla Malla Reddy. With provision of defluoridation plants nearby these areas, access to drinking water has been drastically improved. Groundwater is still used heavily for agricultural purposes. The main restriction on further growth of the district is a better road infrastructure, which would lead to better energy and water infrastructure as well. While access to education and communal empowerment has increased, the area still suffers from seasonal droughts and outbreaks of cholera, diarrhea, and malaria, indicating poor sanitation practices.

Voligonda Mandal Parishad Officer Janaki Reddy says that this may be due to treating the Musi River as a waste site (note that the same acts as a water source). For villages that are being reached by pipeline, water tankers are currently deployed by contract. Figure 35 shows the community capacity assessment of the GPs in Voligonda Mandal.

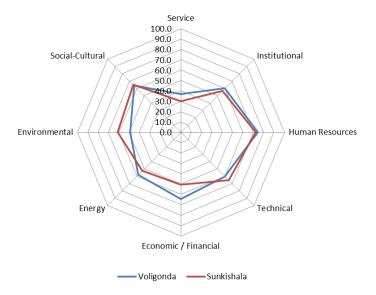




Figure 35: Community capacity assessment of GPs visited in Voligonda Mandal.

The aggregate community capacity grade includes the notes from Voligonda and

Sunkishala GPs and is summarized in Table 23.

Factor	Voligonda
Institutional	В
Human Resources	В
Technical	В
Economic / Financial	В
Energy	В
Environmental	В
Social-Cultural	В
~ACCG	В

Table 23: Aggregate community capacity grade for Voligonda Mandal.

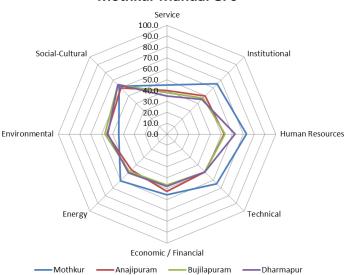
7.1.5 Mothkur Mandal

Mothkur Mandal is located east of Voligonda Mandal and southeast of Yadagirigutta Mandal. Atmakur(M) Mandal is located in between and was also visited, but not enough information was collected for an adequate community capacity assessment. Mothkur is more barren than the agriculturally heavy Voligonda, but recent irrigation projects nearby have spurred farming to start up in the area. The Mandal headquarters is already receiving CPWSS AMR Project water that is coming all the way in from Nalgonda Mandal's Panagal Reservoir. From the perspective of the contractors working on the project to provide access to the AMR Project water to the area, people were excited for new water but were struggling in building the appropriate infrastructure. Furthermore, the contractors were worried that the community would not be willing or would not take the initiative in maintaining the sumps and water towers that were being built to support the AMR Project water supply.



Figure 36: Contractors laying down pipe to bring domestic water supply from the AMR Project to the Mothkur area.

Guram Lakshmi Narasimha Reddy, a Doctor that runs clinics for the blind and general clinics in the Mothkur area, and Assistant Engineer P. Damodhar assisted in the site visits and helped explain the current activity in Mothkur. The construction of the AMR Project expansion into Mothkur provided a unique opportunity to grasp community members perspective on the development. Surprisingly, many were ambivalent and despaired that the water would never come. Others showed excitement about the work bringing a few extra jobs to the area but were uncertain of how the system itself would be installed, indicating institutional weakness. The capacity summaries are below.



Mothkur Mandal GPs

Figure 37:Capacity assessment for GPs visited in Mothkur Mandal.

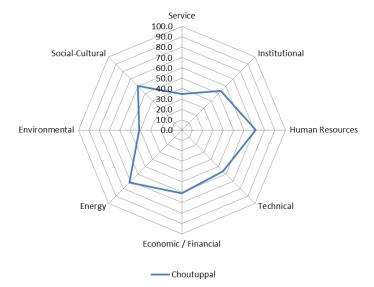
The aggregate capacity of Mothkur Mandal reflects the institutional limitations, with other factors being not too bad or great.

Factor	Mothkur
Institutional	С
Human Resources	В
Technical	В
Economic / Financial	В
Energy	В
Environmental	В
Social-Cultural	В
~ACCG	В

Table 24: Aggregate community capacity of Mothkur Mandal.

7.1.6 Chouttupal Mandal

Chouttupal is primarily a trade town at the T-end intersection of some major highways and it is also the first major rural area outside of the Hyderabad city limits. While this gives the area an economic boost, it also creates a heavy demand of basic necessities like water and energy. Chouttupal currently faces difficulties in meeting this water demand by borewells alone. The groundwater levels have dropped severely and the Indrasena Reddy says that the area contracts water tankers to Chouttupal and area GPs on a regular basis. Due to its reliance on groundwater, Chottupal also has a small set of habitations that are vulnerable to non-safe sources of drinking water; these villages and those that are not fully covered are the primary targets of the water tankers.



Choutuppal Mandal GP

Figure 38: Community capacity assessment of Choutuppal GP.

Note that this area has better access to electricity because of its convenient location near Hyderabad and along main roads; yet struggles with ecological resources.

Factor	Choutuppal
Institutional	В
Human Resources	А
Technical	В
Economic / Financial	В
Energy	А
Environmental	С
Social-Cultural	В
~ACCG	В

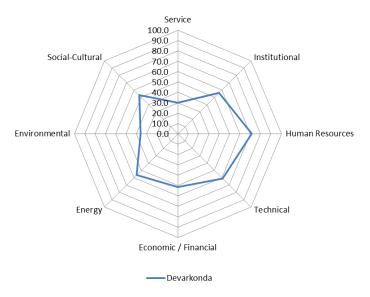
Table 25: Aggregate capacity assessment of Choutuppal Mandal.

7.1.7 Devarkonda Mandal

Devarkonda was one of the most fluoride-ridden Mandals in Nalgonda originally, until a pointed campaign sought to eradicate it by bringing in CPWSS water and defluoridation plants. However, Deputy Engineer K. Hamsaram Rao and Hand pump mechanic Lakshmachari comment that problems arise when the water does not come from their associated treating station of CPWSS at Narsarpally Pumping Station. It is not the stations fault, but rather a breakdown along the piping lines, a failure that occurs frequently and causes stoppage for up to half a week. Because of this uncertainty, almost all houses have their own small storage containers now for backup. The water for the Mandal households is pumped out of a water sump located in Devarkonda RWS subdivision. The electricity is fairly unreliable so the Devarkonda Mandal provides the diesel for operating the pump. Additionally, the DE notes that Devarkonda supports its neighboring Chandempet Mandal during the summers because their groundwater tables bottom out. Both the DE and the mechanic note, separately, that the public participation is very low and often competitive in nature. They say that the few areas where the public participation is high is where the supply system does best.

The DE notes that the RWS office is engaging women to increase public participation and general ownership. Mahila Sangam is a women-focused NGO that provides education about water and sanitation services and is funded by the government; it operates in this area because of the proximity to Scheduled Caste and Schedule Tribe villages. Even still, prostitution and alcoholism seemed common place in this Mandal more so than anywhere else. Some of the water sump operators were visibly drunk on the job at the early hour of 8AM; talking freely about how most people in the area make and drink "Sara," an South Indian moonshine of sorts.

Finally the DE and mechanic spoke about the plans for the future. Since Devarkonda is attracting investment due to possible coal and uranium deposits in the area, they have formally put in a plea to become municipality, making the area eligible for state funding. The community capacity assessment is summarized below.



Devarkonda Mandal GP

Figure 39: Community capacity assessment for Devarkonda. Note the low environmental/ecological and social-cultural scores.

Because of the rampant prostitution and alcoholism in the area, along with the marginalization of the scheduled castes and tribes in the area, the Mandal as a whole score the poorest along with Chandempet for social-cultural.

Factor	Devarkonda
Institutional	В
Human Resources	В
Technical	В
Economic / Financial	В
Energy	В
Environmental	С
Social-Cultural	D
~ACCG	С

 Table 26: Aggregate capacity assessment of Devarkonda Mandal. Note that the C indicates a high level of failure with CPWSS, which is currently occurring.

7.1.8 Huzurnagar Mandal

Huzurnagar is on the southeast side of the Nalgonda District. Huzurnagar enjoys a better location in terms of the water shed as well as an economic boost from nearby Miyalaguda. However, less than half of its villages are fully covered. The primary stated reasons for this inconsistency are the diversion of water supply to Miryalaguda municipality as well as lack of human capital. Deputy Engineer Venkat Reddy and Assistant Engineer Brahmam Babu note that the remaining one-third is scheduled to be covered as soon as the CPWSS has been expanded. Meanwhile, the area depends on groundwater supply and sometimes water tankers during the summer. The area does not face a quality issue as much as that to the north and west, but it still struggles with proper sanitary conditions. The engineers note that the proximity to a successful Mandal is both a blessing and a curse – it provides for some jobs, but it also means that the young talent leaves Huzurnagar as quickly as they can, causing problems in low- to mid-level work.



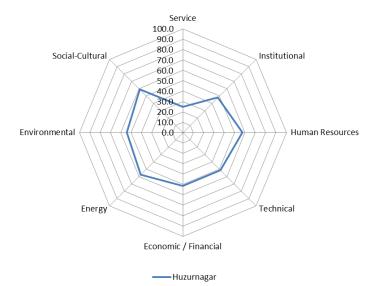


Figure 40: Community capacity assessment of Huzurnagar GP.

Due to the challenges that the area faces in maintaining a sustainable institutional pattern as well as keeping human capital, Huzurnagar ends up being a lower performing Mandal even though an RWS subdivision office is located there. It is expected by Reddy and Babu, however, that with proper focus on infrastructural self-growth rather than relying or Miryalaguda, Huzurnagar may become a better place for families to develop. However, the infrastructural growth has to start with a soft system overlay, or otherwise risk similar pipeline failures as those encountered in Deverkonda.

Factor	Huzurnagar
Institutional	С
Human Resources	С
Technical	С
Economic / Financial	С
Energy	В
Environmental	В
Social-Cultural	В
~ACCG	С

Table 27: Aggregate capacity assessment of Huzurnagar Mandal.

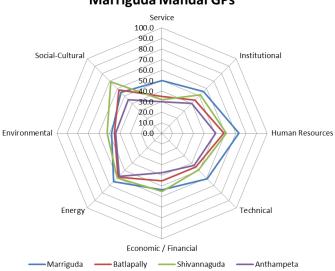
7.1.9 Marriguda Mandal

Marriguda Mandal is located south of Choutuppal and is a great case study of a high-fluoride zone that was also coping with difficulties with water supply, but is now doing better because of the CPWSS expansion to the area. The area was toured with a set of hand pump mechanics, A. Sathya and A. Yaddaya. Both assure that the current status of water is good for the village, yet their further comments indicate that the area is simply doing better than in the past. The area is approximately 75% fully covered, with the remaining villages anticipated to be covered within the next 5 years. The mechanics seemed thankful for access to CPWSS but said that it has introduced a new set of problems. The CPWSS was expanded to area less than two years before the visit. Some places, however, are showing signs of falling apart already. Poorly built storage reservoirs, broken or leaky pipes, and improper or no maintenance has led to a series of distribution-side failures. The problem now has changed from dental and skeletal fluorosis to malaria, cholera, and diarrheal incidences.



Figure 41: Leaking pipe from a CPWSS-fed central reservoir in Anthampeta GP.

The Village Development Officer offered further insight into the situation during the site visit. The domestic water is not coming to all the households, but rather a central point in the village. This is forcing households to balance their water use between hand pumps for generic domestic use and the AMR Project water for drinking and cooking. Furthermore, he said that the area had been experimenting with RHS but stopped after CPWSS was delivered. The process of treating rain water via bleach or chlorine is supposed to be applied to the AMR Project water but locals assume that the water is already fully clean. Furthermore lack of maintenance of the sanitation channels has also contributed to increase in cases of malaria and cholera. The VDO said these are the type of cases that the Sarpanch or Deputy Sarpanch should be taking care of, yet they are often not found by the villagers or when asked by the Mandal. The community capacity assessments for Marriguda are summarized in Figure 42.



Marriguda Mandal GPs

Figure 42: Community capacity assessments of the visited GPs in Marriguda Mandal.

Given the significant variance amongst the capacity factors, excepting energy, a red flag is raised on the sustainable operation of any sort of centralized infrastructure.

Marriguda GP does pretty well across the board because of the presence of development office and access to the main CPWSS line directly to the headquarters. Furthermore, its historic location along fort walls of the Nizam kingdom's horse stables also helped create a transportation infrastructure and corresponding economic boost. Shivannaguda is another religious site dedicated to Lord Shiva, and thus enjoys the respective benefits. However, the other areas suffer easily from lack of empowerment or lack of knowledge or guidance of their newly equipped system. Thus, the Marriguda Mandal places ends up being a mid-level capacity Mandal whose soft system may be built up to properly maintain its own respective water and sanitation infrastructure.

Factor	Marriguda
Institutional	С
Human Resources	В
Technical	С
Economic / Financial	В
Energy	В
Environmental	С
Social-Cultural	В

~ACCG

В

Table 28: Aggregate community capacity of Marriguda Mandal.

7.1.10 Miryalaguda Mandal

Miryalaguda is a large municipality and Mandal in the southeastern part of Nalgonda. The Mandal has a geographic advantage of being nestled between two smaller rivers that break from the Krishna River, which is dammed at the Nagarjuna Sagar. However, Miryalaguda uses water from before the dam through an extended canal system from the Puthangadi Balancing Reservoir, which is the first main reservoir of the AMR Project. The water travels via the North-South Left Canal to the Peda Devulapally Balancing Reservoir, where it is treated and supplied to the Miryalaguda area. As such, it essentially has two different supply lines. Miryalaguda uses the smaller rivers for industrial purposes, such as fishing and mining.



Figure 43: Town Planning Officer shows the plans for the absorption of surrounding GPs into Miryalaguda municipality. One of the evaluated GPs, Chinthapally, is south of Miryalaguda and another, Venkatadripallam, is southwest of Miryalaguda.

At the time of the visit, Miryalaguda's municipality was issued a government order to add seven GPs, essentially an order to expand the municipal infrastructure to the respective areas of the Mandal. The municipality received Rs. 140 crore [~\$27M] to expand to the surrounding GPs, but Rosaiah says that at least Rs. 46 crore [~\$9M] for the system to be implemented properly. The order to develop surrounding GPs is laudable, but it invokes the classic wealth-tax system rather than internal development. As can be seen by the capacity assessment, one of the rural areas has been entrepreneurial while another has faced tremendous institutional and social-cultural challenges. The Town Planning Officer Rahul R. believes that it is possible to expand services, but the biggest problem is lack of knowledge of the communities, which he believes to be a two-way street. He proposes a creative solution of taking a GIS survey of the Miryalaguda area, as well as the entire Nalgonda District and Telangana region. The micro-level GIS data helps with better understanding the watershed, village details, and existing systems such as water and sewage lines. He was enthusiastic in pitching the idea, but quickly identified that the bureaucracy of approving such level of work would be tremendous. In addition, the GIS would become public data, which may not sit well with some of the officials who are corrupt and take advantage of information parity.

Two important people, Miryalaguda Municipal Chairperson Marugu Rosaiah and the municipality's Deputy Engineer Venkataswarulu, were able to afford time for an interview. Both officers started the conversation with underlining that Miryalaguda still faces water scarcity despite the official statistics. The previous funds for expansion to municipality level was not enough for providing all of the allocated residents with sufficient water supply; their comments fall against the 96% fully covered and 86 lpcd statistics for the municipality. This indicates inconsistency between the reported statistics and the actual statistics. As they further described the system, it is clear that the reported statistics could be a greater average across the year and thus not account for periodic breakdowns. Currently, the municipality supplies water by ward, exchanging which ward will get the supply every three days. For the allocated day, that ward receives water for about 2-4 hours, which they say is enough to fill up their respective tanks, usually 1,000L in size. Assuming that this tank is meant for a typical household of six, it comes out to roughly 60lpcd. These assumptions fail for the many apartment complexes that are in the area, which may have larger tanks, but also are much denser.

Finally, it is important to note that this municipality and Mandal in general seem richer in technical expertise, in institutional awareness, and human capital. While one visited village, Venkatadripallam, had an underwhelming assessment due to lack of leadership and poor maintenance, others performed either equal to or better than the rest of the villages in the district. Zapthiveeragudem and Chinthapally especially demonstrate that entrepreneurial efforts by community members with regards to water supply may have a positive impact. Miryalaguda's capacity summary is shown here.

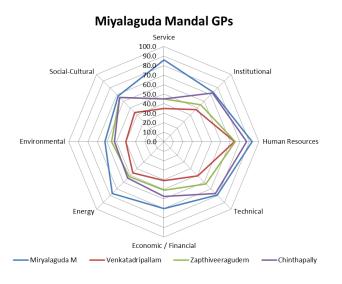


Figure 44: Community assessment of the Mandals visited in Miryalaguda Mandal. The wide blue circle is the assessment of Miryalaguda municipality itself. Note that two of the visited villages with different capacities are being absorbed by Miryalaguda's municipality expansion.

Even though Miryalaguda fares much better than most other Mandals in institutional awareness and operation, human capital, and economy, significant variances within the Mandal indicate fully advanced centralized supply systems may not yet fit the still developing area. Rather, creative solutions such as a GIS survey of the area, as suggested by Rahul R., or private entrepreneurial ventures, such as the defluoridation treatment and water distribution facility conceived by Police Constable Sudhaker, supported with quality monitoring by the area government, may be better for the area.

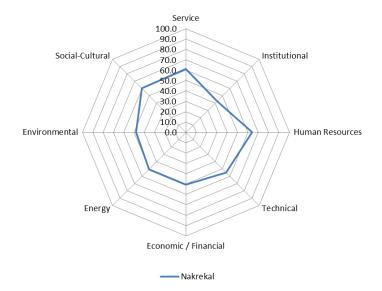
Factor	Miryalaguda
Institutional	А
Human Resources	А
Technical	В
Economic / Financial	А
Energy	В
Environmental	В
Social-Cultural	В
~ACCG	В

Table 29: Aggregate capacity of the Miryalaguda Mandal.

7.1.11 Nakrekal Mandal

Nakrekal Mandal is east of Nalgonda Mandal and northwest of Miryalaguda. It is at a crossroads between the three major municipalities of Nalgonda, Miryalaguda, and Survapet, and grow out as a trade and mining town. A canal passes through Nakrekal intended for agricultural purposes; water flows only after the moon season after the summer and the canal dries up within six months. While drinking water is extended to the households in Nakrekal from the Panagal Reservior in Nalgonda through the AMR Project CPWSS, much of the actual domestic water supply is supplied by PWSS and hand pumps. This diversified portfolio of water supply has lent the area a better water supply than most habitations in the District. However, Nakrekal's offices are struggling to manage this diversified portfolio without the human capital or the technical capability. In a sense, it is a system that sees multiple different sources of input, but faces an uncertainty in knowledge of their capabilities of management, in a sense the respective decision and control variables available to the Mandal. As such, the expansion of CPWSS, according to the RWS Section Officer Madhushudharan, has been much slower than expected and thus slowed such provision to surrounding Mandals, such as

Thipparthy, which shall be addressed in a subsequent section. Furthermore the area struggles in managing their respective solid waste and general sanitation as well as proper supply of electricity. The summarized capacity assessment is presented in Figure 45.



Nakrekal Mandal GP

Figure 45: Community assessment of Nakrekal Mandal.

Though much of Nakrekal Mandal has greater access to drinking water supply, its aggregate capacity falls lower due to lack of leverage in human, environmental, and institutional ability to achieve sustainable operation of the greater domestic water system.

Factor	Nakrekal
Institutional	В
Human Resources	С
Technical	В
Economic / Financial	В
Energy	В
Environmental	С
Social-Cultural	В
~ACCG	В

Table 30: Aggregate capacity of Nakrekal Mandal.

7.1.12 Nalgonda Mandal

Nalgonda Mandal is at the heart of the Nalgonda District; the Mandal includes Nalgonda municipality that houses all the Zilla Parishad, the RWS department headquarters, and the Drinking Water Management Agency. The Mandal is well equipped with water supply and is upgrading its infrastructure to include larger sewage and power lines for a bigger tomorrow. All of the Mandal is supplied by the AMR Project water that comes from Nagarjuna Sagar and travels via canal to the Panagal Reservoir. However, the challenge going forward for the Nalgonda Mandal area is that of multisystem design and integration. As per Suresh, the area can no longer afford to "keep digging the same road month after month just to fix or lay another line."

Here it is important to make a special note about the DWMA. Though its name suggests heavy involvement with the drinking water supply, its sole purpose is to monitor the groundwater levels and quality in the Nalgonda District and sponsor work as published by Rafiuddin (2007). However, it should be better integrated with the RWS for better recommendation of installment of PWSS, hand pump, and general watershed information. Currently, it serves more of a think-tank rather than an agency of the government.

Panagal, where the reservoir, centralized treatment facility, and RWS headquarters are located, was also chosen as a place for site visit. It presented an interesting dichotomy of advanced technology with historic systems and a typical village. Panagal is home to one of the oldest temples in India; the temple is pictured in Figure 46. The temple served as not only a space for worship, but also a place for rain water collection and small-scale farming. Thought it is not actively maintained, the temple still

serves as a striking example of a visionary sustainable life-style for its personnel. Unfortunately, it was battered and vandalized during raids by the Islamic Nizam Empire. The habitants of Panagal still clean the temple once or twice every month as a sign of respect to their respective heritage.

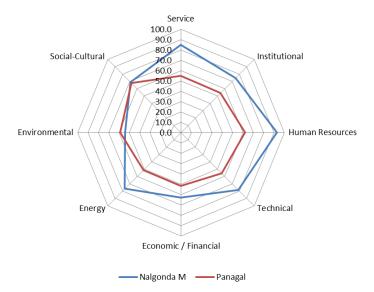




Figure 46: Community assessment of GPs visited in Nalgonda Mandal.

Nalgonda's infrastructure is already advanced and well-equipped with CPWSS; as a result of the exposure over the last decade to the development of CPWSS for not just the Mandal but also the District. The institutional capacity in the Mandal has increased tremendously and is still rising to meet the needs of the growing concerns of Nalgonda. The local colleges and universities have also been feeding well into the RWS services, where jobs have increased due to foreign direct investment, foreign service aid, and governmental institution. Lastly, the technical capabilities have diversified; in dealing with the many initial problems associated with CPWSS, the operation and maintenance has become streamlined in the Mandal.

Factor	Nalgonda
Institutional	А
Human Resources	А
Technical	А
Economic / Financial	В
Energy	В
Environmental	В
Social-Cultural	В
~ACCG	В

Table 31: Aggregate capacity assessment of the Nalgonda Mandal.

7.1.13 P. A. Pally Mandal

P. A. Pally is located southwest of Nalgonda Mandal and east of Devarkonda Mandal. In order to go to the Nagarjuna Sagar Dam, one typically travels through or stays in P. A. Pally Mandal. The area is rural, but its geographic proximity to Narsarpally Treatment Facility, a main treatment and distribution node of the AMR Project CPWSS network, means that P. A. Pally Mandal has the chance to be fully covered. However, this was only true to just over half of the habitations in the Mandal. The site visit to Chilkamarry brought this to light. According to Venkatasham, the hand mechanic who was the guide to the P. A. Pally area and Chilkamarry specifically, this was "the biggest problem village," for which he provided three main reasons. First and foremost, Chilkamarry had very poor leadership; its Sarpanch was often nowhere to be found and did not participate in the greater Mandal meetings of Sarpanches that occur every three months. Secondly, the village was unfamiliar with the technical operations of a PWSS even. The pump and defluoridation equipment stayed locked up in a small house, to which the Sarpanch has the key, but no one knew how to operate and maintain it even if they were given the key.



Figure 47: Picture of the Overhead Storage Reservoir (OHSR) in Chilkamarry. The OHSR was almost always empty which prompts the villagers to use hand pumps as the main source of water. Note the small house next to the OHSR, where the pump and defluoridation equipment for this PWSS was kept locked.

Lastly, the area had poor knowledge of proper sanitation and hygiene, which further aggravated the negative results of poor water supply. Venkatasham further commented on the social impact of Chilamarry being literally "bypassed" as fresh water went along the main road, which is next to Chilkamarry, and not to the village itself. An already poor village now felt unworthy and discarded; he compared the situation to that of transportation to school. While everyone received a free ride on the school bus, the village was like a kid who would be skipped even though he was directly on the bus's route.

Aside from the specific situation of Chilkamarry, the rest of P. A. Pally mandal enjoyed better water supply, better economy from the regional tourism for the Sagar, and better transportation service because of the road direct from Hyderabad to the Sagar. However, it still suffered from frequent power outages. Furthermore, the lack of accountability of local leadership often exacerbated human services-related problems.



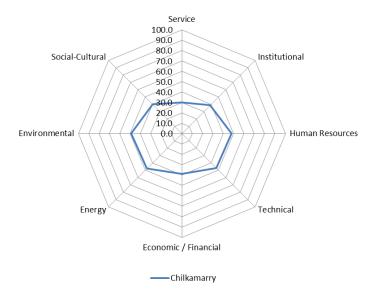


Figure 48: Community capacity assessment of the visited GP in P.A. Pally.

Even though the rest of the Mandal may be better equipped to handle higher-level technological alternatives, the fact remains that the Mandal's leadership does not have a set of operational rules to handle localized breakdowns or faults in leadership. The 5-year term is supposed to be constantly reviewed by the greater leadership, and thus indicates a higher-level failure. Furthermore, a village like Chilkamarry should not be ignored access based on their socio-cultural capital (in caste or tribe), much less economic status.

Factor	P.A. Pally
Institutional	С
Human Resources	В
Technical	В
Economic / Financial	В
Energy	В
Environmental	В
Social-Cultural	С
~ACCG	В

Table 32: Aggregate capacity assessment of P.A. Pally Mandal.

7.1.14 Narayanpur Mandal

Narayanpur Mandal is south of Choutuppal and east of Marriguda. It receives moderate levels of drinking water supply, with much of the area being supplied by the AMR Project CPWSS. Of the 72 villages, 42 are fully covered and the rest have varied levels of coverage below 40lpcd. Narayanpur also faces problems with water quality, as with Marriguda Mandal, and has thus received the CPWSS water to curb the heavy fluoride mineral content in the area's groundwater. Before the network had been extended to Naryanpur, the area suffered from common drought, which was only worsened by the heavy fluoride content. Some parts have adopted RHSs as a means to cope with seasonal variations in water availability and water quality. One such village that was visited was Vaillapally.

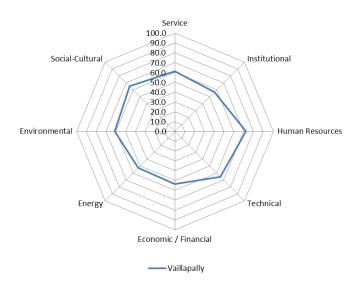


Figure 49: A rainwater harvesting scheme outside the house of the Deputy Sarpanch of Vaillapally.

Vaillapally is a 6,000-strong GP located in the heart of Narayanpur and is a testament to possible success of RHS on a large scale in the Nalgonda Region. The GP is made up of several smaller habitations and villages, but almost all of them have RHS.

The systems is setup as follows: each household uses the flat roofs as a catchment for rainwater, which is then collected by sinkhole and sent through PVC pipe to a rapid ashand-sand filter and then into a ground-level, cement-based storage tank. The size of these tanks varies, but it was found that a common household has two 3,000L tanks. The filters are cleaned bi-weekly either by the homeowner or by a volunteering neighbor familiar with the system. Households use this water for drinking and cooking year around, and the deputy Sarpanch claims that many prefer rainwater to CPWSS water because it "tastes better." In all, latest census puts water supply to Vaillapally at just over 61lpcd.

In addition to the RHS, the community supplements its domestic needs with CPWSS water and PWSS water. However, the PWSS water is never used for drinking or cooking purposes because of incredibly high levels of fluoride, up to 7.8mg/L. These different streams of water are provided by household connections, which each household pays Rs. 10 per month, with an astounding collection success rate of over 90%.



Naryanpur Mandal GPs

Figure 50: Community assessment of GP visited in Narayanpur.

Vaillapally may be a bit of an outlier not just in Narayanpur Mandal, but in Nalgonda as a whole. Not as many villages focus on communal success of basic water and sanitation. Nevertheless, the area still has much to improve in terms of economic will. Some new ideas for economic success in the area include mining, which would strain the water supply component, perhaps why its citizens have been careful before leaping to decisions.

Factor	Narayanpur
Institutional	В
Human Resources	В
Technical	А
Economic / Financial	В
Energy	В
Environmental	В
Social-Cultural	А
~ACCG	В

Table 33: Aggregate capacity of Narayanpur Mandal.

7.1.15 Suryapet Mandal

Suryapet is a major economic asset of Nalgonda District. It is a municipality and Mandal located northeast of Nalgonda and Nakrekal, and along the main road from Hyderabad to major cities along the eastern coast of Andhra Pradesh. Suryapet's primary economy comes from infrastructure-based construction contracts. These contracts often include work in Nalgonda itself. Municipal Chairman Meela Satyanaryana acted as the primary guide to the municipality and the mandal itself. He is also the Managing Director of a regional piping and construction company, Sudhaker Group of Companies. Interestingly enough, one of his bets is the proliferation of RHS as a means for drinking water sourcing and supply; he makes several levels of water drums and storage tanks, very similar to "Jo-Jo" tanks in South Africa.



Figure 51: Water drums and water storage tanks manufactured in Suryapet.

The progressive leadership of Satyanarayana helped push the municipality to full coverage; however, the rest of the Mandal lags behind. Of the 52 villages under Suryapet Mandal, only two are fully covered and a majority has access to less than 30lpcd. Despite proximity to the Musi River, the Mandal had not yet been able to tap its potential through a successful CPWSS yet, though plans are abound. Furthermore, the inconsistent power supply to the area makes it much more difficult for drawing groundwater for PWSSs. The leadership has been doing its best to control the rest of the variables, like water quality and sanitation. Mechanics and operators clean OHSRs with chlorine and alum, and then tested for quality every 15 days. The sewage system of the municipality takes care of the wastewater and solid waste within its borders; it is then taken outside of the municipality for deposit or composting. However, this doesn't exist in the rest of the Mandal.



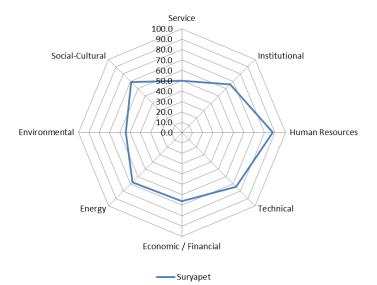


Figure 52: Community Capacity Assessment of Suryapet municipality.

Suryapet's municipality has been able to address its ecological and infrastructural shortfalls with creative uses of human capital, such as RHS and network of water operators. The Mandal at large, however, does not have that luxury. As such, it scores lower than other municipality-based Mandal areas. Specifically, the lack of power to areas outside the municipality hinders PWSSs and general drawing of water. Furthermore, this problem becomes compounded with physical water scarcity in the area.

Factor	Suryapet
Institutional	В
Human Resources	В
Technical	В
Economic / Financial	В
Energy	С
Environmental	С
Social-Cultural	В
~ACCG	В

Table 34: Aggregate capacity assessment of Suryapet Mandal.

7.1.16 Chandempet Mandal



Figure 53: Villagers of Timmapuram showing the only borewell for the community, for which the pump is broken. The pump inside the aluminum shed in the background.

The last area to be considered is Chandempet Mandal, which is located on the southwestern most part of Nalgonda District and borders Ranga Reddy District and Krishna River, which is the river that is dammed for Nagarjuna Sagar and feeds the AMR Project CPWSS. The portion of Chandempet that is against the River is very mountainous and does not lend itself to many villages. The sites visited are located about six kilometers short of this mountain range. Hand pump mechanic Narsimha was the guide for the site visits, and Sarpanch Pappayya led the discussion for Timmapuram specifically. The theme for this village was lack of human resources, general poverty, and social-cultural apathy, all of which contributed to Müeller's definition of water scarcity.

The area mostly consisted of scheduled castes (SC) or scheduled tribes (ST). These were previously marginalized communities that are now prioritized for provision of water, sanitation, and electricity; the hand pump's definition of this prioritization resembled affirmative action in the USA. Some NGOs, like Sri Sailam, have been assisting the area. The community members complained that leadership becomes corrupt because of this prioritization; the elected Sarpanch who must be of the respective SC or ST is typically hand-picked by the wealthier non-SC or ST families in the same village. According to the villagers, money allocated towards communal projects, such as motors for groundwater pumping or digging of sewage canals, would mysteriously disappear. Essentially, almost all villagers including the hand pump mechanic and the Sarpanch himself claimed that the money burned away in bureaucratic corruption

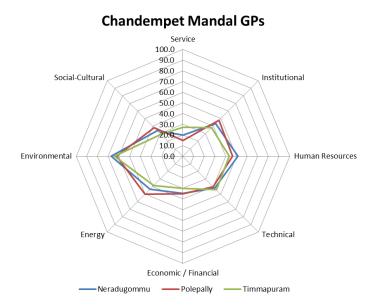


Figure 54: Community capacity assessment of visited GPs in Chandempet Mandal.

Of 101 habitations, only a third of Chandempet is fully covered, with the rest at varied levels of coverage and eight with access to non-safe sources. Most of the area is covered by PWSS and rely heavily on groundwater pumps, and thus electricity. Moreover, residents complain that broken pumps are rarely fixed; here, Narsimha notes that some folks typically steal and sell the pump parts rather than use it for intended purposes. Additionally, Narsimha states some of the borewells end up being submerged during the monsoons because of the proximity to the Krishna River. It was also noted that households do not pay Rs. 30 per month maintenance fee in addition to not paying the initial connection costs, which range from Rs. 2500-3000. Furthermore, Narsimha said that the incoming project funds were often allocated to outside the community contractors rather than in-community labor force, making it possible for leadership to take paybacks with very little evidence. Narsimha and some of the residents also commented on the sad state of school affairs. Only a third of the district-funded teachers showed up for work and most were incompetent or drunk on the job. As such, the literacy rate has been dropping from the already low rate of 40%.

Factor	Chandempet
Institutional	С
Human Resources	С
Technical	В
Economic / Financial	С
Energy	В
Environmental	В
Social-Cultural	С
~ACCG	С

Table 35: Aggregate capacity of Chandempet Mandal.

Though Chandempet has a better ecological system, its soft system breakdowns contribute to water scarcity to the area. Efforts by Sri Sailam should be focused in increasing awareness of proper water system operation and management along with delivering water supply, as they had planned to do. Effectively, this NGO's approach would be akin to implementing a CPWSS for multiple areas in Chandempet; and the evidence is overwhelming that such a system has a chance of multiple levels of failure.

7.2 Summary of Capacity Assessment of Nalgonda

		Human		Economic /	_		Social-	
Mandal	Institutional	Resources	Technical	Financial	Energy	Environmental	Cultural	~ACCG
Alair	С	С	С	В	В	С	В	С
Bhongir	В	С	В	В	В	С	В	В
Chandempet	С	С	В	С	В	В	С	С
Choutuppal	В	А	В	В	А	С	В	В
Devarkonda	В	В	В	В	В	С	D	С
Huzurnagar	С	С	С	С	В	В	В	С
Marriguda	С	В	С	В	В	С	В	В
Miryalaguda	А	А	В	А	В	В	В	В
Mothkur	С	В	В	В	В	В	В	В
Nakrekal	В	С	В	В	В	С	В	В
Nalgonda	А	А	А	В	В	В	В	В
Narayanpur	В	В	А	В	В	В	А	В
P.A. Pally	С	В	В	В	В	В	С	С
Suryapet	В	В	В	В	С	С	В	В
Voligonda	В	В	В	В	В	В	В	В
Yadagirigutta	В	В	С	В	А	В	В	В

Table 36: Summary of aggregate capacities of Mandals in Nalgonda District.

From the table, it can be concluded that Nalgonda as a District has an ACCG of B. In considering the capacity grades assigned to the Mandals that were visited, one immediately notices that no Mandal's ACCG is either too high (no A's) or too low (no D's). Five Mandals have an ACCG of C, indicating that these Mandals are ill-equipped to handle complicated systems like CPWSS or even PWSS, both of which received a PCG of A and B, respectively. Of those that received a B, some may be considered of higher capacity, such as Miryalaguda and Nalgonda Mandals, while others may be considered lower, such as Marriguda Mandal. Nevertheless, this provides a holistic picture of what types of solutions each Mandal may be capable of handling.

Consider the success of the respect of CPWSS, PWSSs, or RHSs that are in the communities with the associated capacity grade. Places like Nalgonda and Miryalaguda municipalities have higher success rates with CPWSS because of their tight institutional awareness, keen technical control, and human capital. Yet, for the exact opposite reasons, you can find CPWSS failing or on the cusp of failing in places like Marriguda and Devarkonda Mandals. While the LOCCA methodology is not a sure measure of risk in design, it provides helpful information on possible successes or failures of policies such as CPWSS. Furthermore, it provides a platform for both quantitative and qualitative assessment between governance levels, which could assist leaders at these levels to make better informed decisions. Lastly, this process also helped engage the voice of the community and identify ways in which individual members could participate in the greater system for communal good.

125

Chapter 8: Conclusion

Water supply remains a significant challenge for communities around the world, irrespective of socio-economic status or ecological advantage. Improper institutional leadership, lack of technical knowledge, apathy or lack of agency, and general lack of access to resources are prime reasons for why the matter is worse developing communities around the world. Decision frameworks are used to predict what may be the best solution for any given community; however, many of these frameworks are unable to capture a comprehensive snapshot across institutional levels and typically forget to include community members and leaders as part of the decision-making process. The Louis-Ostrom Comprehensive Capacity Analysis (LOCCA) methodology is suggested as a possible framework that could address these shortfalls. The crux of the methodology is a recursive assessment of capacity at the village level which is then aggregated across other villages in the same Mandal. The aggregate community capacity grades of Mandals are then compared and aggregated once more to arrive at the ACCG for the District. This multi-level process accounts for a comprehensive, intra-institutional, and participatory assessment of a community's ability to adopt water-related technology-based policies.

The LOCCA methodology is presented through a case study of the Nalgonda region, which faces water scarcity, poor water quality, and operational challenges with water supply in general. Three technologies that are prevalent in the area are first considered: comprehensive protected water supply schemes (CPWSS), protected water supply schemes (PWSS), and rainwater harvesting schemes (RHS). CPWSS is a surface water-sourced and centralized treatment water delivery method across a wide network of

villages. PWSS is a groundwater-based scheme that addresses the needs of a couple villages with quality control through defluoridation equipment. RHS is typically a household-level roof-based rainwater harvesting system that supplements water from additional sources like PWSS or RHS.

In considering Nalgonda, several challenges crop up in employing a wide network style solution like CPWSS. These include institutional knowledge, technical capabilities, communal ownership and agency, and follow-through. CPWSS has found success in areas where these issues have been properly addressed, like in the municipalities of Nalgonda and Miryalaguda. It has also faced failure in places like Devarkonda. PWSS is the ready alternative, but relies heavily on consistent access to electricity, proper communal maintenance, and defluoridation equipment due to heavy mineral content in water. RHS has acted primarily as supplementary mechanism for drinking and domestic uses of water, and has found success in almost all places implemented.

In addressing the drinking water situation in Nalgonda, the District should support RHS-type solutions to trap the monsoon pouring and increment domestic water supply by up to 20lpcd. Furthermore, leadership should consider greater level of accountabilities by implementing a shorter term for Sarpanches or providing more power to the Gram Sabha. In addition, the relationship between domestic and economic uses of water should be clearly delineated and educated to folks around the District as to prevent overdrawing for agricultural and mining purposes. Finally, alternative means of financing and budgeting of infrastructure-related projects should be considered to lower corruption and increase rate of return on investment on installed projects.

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	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight
1	Service Capacity							
C11	Service Level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	40	1
fı	Score Service Capacity					$\sum C_{ij} w_j$	40	1
2	Institutional Capacity							
C21	Body of Legislation	None	Basic	Intermediate	Complete	Advanced	21	0.1
C22	Associated Regulation	None	Basic	Intermediate	Complete	Advanced	21	0.1
C23	Administrative Agencies	None	State	District	Mandal	Local	60	0.25
C_{24}	Administrative Processes	None	Basic	Intermediate	Complete	Advanced	21	0.25
C ₂₅	Governance	None	National	Regional	State	Local	81	0.3
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$	48.8	1
3	Human Resources Capacity	1	1					
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2
				Health Scientist	Health Scientist	Health Scientist		
					Engineer	Engineer		
						Lawyer		
0						Public relations manager		
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	45	0.4
				Laboratory technician	Laboratory technician	Laboratory technician		
				Water systems operator	Water systems operator	Water systems operator		
					Health Inspector	Health Inspector		
					Administrative assistant Water meter leader	Administrative assistant Water meter leader		
					water meter reduer	IT technician		
C33	Unskilled Labor	Craftsman	Clerk	Clerk			100	0.3
-33		cranomdi	Mechanic assistant	Water meter reader			100	0.5
			succentrative assistant	Water systems worker				
C34	Illiterate	Caretaker	Caretaker				100	0.1
f2	Score Human Resources Ca					$\sum C_{ii} w_i$	71	
4	Technical Capacity							
C ₄₁		Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	50	0.3
				Control Water Quality	Control Water Quality	Control Water Quality		
					Control Pipes	Monitor pipes network		
						Monitor Treatment		
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	41	0.4
			Minor repair	Major repair	Major repair	Check/maintain network		
					Maintain pipes	Check/maintain meter		
						Maintain IT systems		
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	21	0.2
C_{44}	Supply Chain	None	National supplier	Regional supplier	National manufacturer	National manufacturer	61	0.1
					regional supplier	local supplier		
f4	Score Technical Capacity					$\sum C_{ij} w_{j}$	41.7	
5	Economical and Financial C	1						
C51	Private Sector %	None	International	National	Regional	Local		
C_{52}	Bonds Rating	Aller and a					70	
		None	Regional	State	District	Mandal and Local	70	0.10
C53	User Fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	70 25	0.10 0.30
C54	Budget	None None	Uniform flat rate Basic accounting	Single block rate Annual	Increasing block rate Tracked bi-annually	Increasing block rate Tracked quarterly	70 25 45	0.10 0.10 0.30 0.20
		None	Uniform flat rate	Single block rate <mark>Annual</mark> Real estate	Increasing block rate Tracked bi-annually Real estate	Increasing block rate Tracked quarterly Real estate	70 25	0.10 0.30
C54	Budget	None None	Uniform flat rate Basic accounting	Single block rate Annual	Increasing block rate Tracked bi-annually Real estate Equipment	Increasing block rate Tracked quarterly Real estate Equipment	70 25 45	0.10 0.30 0.20
C54	Budget Asset Values	None None None	Uniform flat rate Basic accounting Real Estate	Single block rate Annual Real estate Equipment	Increasing block rate Tracked bi-annually Real estate Equipment Cash	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks	70 25 45 61	0.10 0.30 0.20 0.20
C54	Budget Asset Values Debt	None None None None	Uniform flat rate Basic accounting Real Estate Rating (b)	Single block rate <mark>Annual</mark> Real estate	Increasing block rate Tracked bi-annually Real estate Equipment	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa)	70 25 45 61 55	0.10 0.30 0.20
C ₅₄ C ₅₅ C ₅₆	Budget Asset Values Debt Score Economical and Fina	None None None None	Uniform flat rate Basic accounting Real Estate Rating (b)	Single block rate Annual Real estate Equipment	Increasing block rate Tracked bi-annually Real estate Equipment Cash	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks	70 25 45 61	0.10 0.30 0.20 0.20
C ₅₄ C ₅₅ C ₅₆ f ₅ 6	Budget Asset Values Debt <u>Score Economical and Fina</u> Energy Capacity	None None None ncial Capaci	Uniform flat rate Basic accounting Real Estate Rating (b) ty	Single block rate Annual Real estate Equipment Rating (bb)	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) <u>∑C₁₁w₁</u>	70 25 45 61 55 <u>54.3</u>	0.10 0.30 0.20 0.20
C ₅₄ C ₅₅ C ₅₆ f ₅ C ₆₁	Budget Asset Values Debt <u>Score Economical and Fina</u> Energy Capacity Primary Source	None None None None ncial Capacit	Uniform flat rate Basic accounting Real Estate Rating (b) fy Non-conventional	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\sum C_{ij}w_j$ Electricity high voltage	70 25 45 61 555 54.3 70	0.10 0.30 0.20 0.20 0.10
C_{54} C_{55} C_{56} f_5 C_{61} C_{62}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up	None None None None ncial Capaci None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\sum C_{ij}w_j$ Electricity high voltage Generator > 50 HP	70 25 45 61 55 54.3 70 40	0.10 0.30 0.20 0.20 0.10
C_{54} C_{55} C_{56} f_5 C_{61} C_{62} C_{63}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget	None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None Very high	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) ΣC ijW j Electricity high voltage Generator > 50 HP Low	70 25 45 61 55 54.3 70 40 50	0.10 0.30 0.20 0.20 0.10 0.10
C_{54} C_{55} C_{56} f_5 C_{61} C_{62} C_{63}	Budget Asset Values Debt Score Economical and Fino Energy Capacity Primary Source Back up % of Budget Outage Rate	None None None None ncial Capaci None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Low Very low	70 25 45 61 55 54.3 70 40 50 30	0.10 0.30 0.20 0.20
C_{54} C_{55} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity	None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None Very high	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) ΣC ijW j Electricity high voltage Generator > 50 HP Low	70 25 45 61 55 54.3 70 40 50	0.10 0.30 0.20 0.20 0.10 0.10
C_{54} C_{55} C_{55} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} 7	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) Ty Non-conventional None Very high High	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$	70 25 45 61 55 54.3 70 40 50 30 47.5	0.10 0.30 0.20 0.10 0.10 0.4 0.4 0.1 0.1 0.4
C_{54} C_{55} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_7 C_{71}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) fy Non-conventional None Very high High Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high	70 25 45 61 55 54.3 70 40 50 30 47.5	0.10 0.30 0.20 0.10 0.10 0.4 0.1 0.1 0.4 0.1
C_{54} C_{55} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_7 C_{71}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity Quantity (stock)	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) Ty Non-conventional None Very high High	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\sum C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\sum C_{ij}w_j$ Very high Very high	70 25 45 61 55 54.3 70 40 50 30 47.5	0.10 0.30 0.20 0.10 0.10 0.4 0.4 0.1 0.1 0.4
C_{54} C_{55} C_{56} C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} f_7	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality (stock) Score Environmental Capacity	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) fy Non-conventional None Very high High Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high	70 25 45 61 55 54.3 70 40 50 30 47.5	0.10 0.30 0.20 0.10 0.10 0.4 0.1 0.1 0.4 0.75
C_{54} C_{55} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} f_7 8	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity Quantity (stock) Score Environmental Capacity Score Environmental Capacity	None None None None None None None Very low Very low Very low	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None Very high High Low Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high Very high $\Sigma C_{ij}w_j$	70 25 45 55 54.3 70 40 50 30 47.5 50 41 45.5	0.10 0.30 0.20 0.10 0.10 0.4 0.4 0.1 0.1 0.4 0.4 0.4 0.75 0.25
C_{54} C_{55} f_5 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} f_7 g_7 g_7 g_7 g_8 C_{81}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quantity (stock) Score Environmental Capacit Score Environmental Capacit Communities/Ownership	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None Very high High Low Low Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium Medium Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high $\Sigma C_{ij}w_j$ Very high	700 255 455 555 555 550 400 500 47.5 500 411 45.5	0.10 0.30 0.20 0.20 0.10 0.10 0.10 0.10 0.10 0.1
C_{54} C_{55} C_{56} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} f_7 g_7 g_8 C_{81} C_{82}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity Quality and Sensitivity Quality and Sensitivity Cuanity (stock) Score Environmental Capacit Social and Cultural Capacit Communities/Ownership Stability	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) fy Non-conventional None Very high High Low Low Low Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium Medium Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high Very high $\Sigma C_{ij}w_j$ Very high Very high Very high Very high Very high	70 25 45 55 55 54.3 70 40 50 30 40 50 30 40 50 40 40 50 50 41 45.5	0.10 0.30 0.20 0.10 0.10 0.4 0.4 0.1 0.4 0.75 0.25 0.25 0.25
C_{54} C_{55} C_{55} C_{61} C_{62} C_{63} C_{64} C_{71} C_{72} f_7 f_7 R_{81} C_{83} C_{83}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity Quantity (stock) Score Environmental Capacit Communities/Ownership Stability Equity	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) ty Non-conventional None Very high High Low Low Low Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium Medium Intermediate Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\sum C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\sum C_{ij}w_j$ Very high Very high Very high Very high Very high Very high Very high Very high	700 255 455 554.3 700 400 500 300 47.5 500 411 4555 411 411 500	0.10 0.30 0.20 0.20 0.10 0.4 0.4 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
C_{54} C_{55} C_{55} C_{61} C_{62} C_{63} C_{64} C_{71} C_{72} f_7 f_7 R_{81} C_{83} C_{83}	Budget Asset Values Debt Score Economical and Fina Energy Capacity Primary Source Back up % of Budget Outage Rate Score Energy Capacity Environmental Capacity Quality and Sensitivity Quality and Sensitivity Quality and Sensitivity Cuanity (stock) Score Environmental Capacit Social and Cultural Capacit Communities/Ownership Stability	None None None None None None None None	Uniform flat rate Basic accounting Real Estate Rating (b) fy Non-conventional None Very high High Low Low Low Low	Single block rate Annual Real estate Equipment Rating (bb) Conventional electricity Generator < 10 HP High Medium Medium Medium Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash Medium Large Rating Electricity mid-voltage Generator < 50 HP Medium Low High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Rating (a-aa) $\Sigma C_{ij}w_j$ Electricity high voltage Generator > 50 HP Low Very low $\Sigma C_{ij}w_j$ Very high Very high $\Sigma C_{ij}w_j$ Very high Very high Very high Very high Very high	70 25 45 55 55 54.3 70 40 50 30 40 50 30 40 50 40 40 50 50 41 45.5	0.10 0.30 0.20 0.10 0.10 0.4 0.1 0.1 0.4 0.1

Appendix I: Community Capacity Assessment of Nalgonda, with RWS

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 I/p/d	60 - 80 l/p/d	> 80 l/p/d	70	1	70
f_1	Score Service Capacity					$\sum C_{ij} w_i$		1	70
2	Institutional Capacity								
	Body of legislation	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	75	0.1667	12.5
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C25	Governance	None	State	District	Mandal	Habitational	95	0.1667	15.83333
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	75	0.1667	12.5
<u>f</u> 2 3	Score Institutional Capacity	(aulidar)				$\sum C_{ij} w_j$		1	69.16667
	Human Resources Capacity (service pu Professionals	None	None	Administrativo suporvisor	Administrative manager	Administrative manager	82	0.2	16.4
C ₃₁	Professionals	None	None	Administrative supervisor Health Scientist	Administrative manager Health Scientist	Health Scientist	82	0.2	10.4
				nearth Scientist	Engineer	Engineer			
					Lightee	Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	85	0.2	17
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			100	0.2	20
			Mechanic assistant	Water meter reader					
				Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker				100	0.2	20
C35	Access to Higher Education	None	State	Regional	District	Mandal	65	0.2	13
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	86.4
	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	85	0.2	17
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
C	Maintonanco	None	Clean water systems	Chask water systems	Chask/maintain water systems	Monitor Treatment	65	0.2	13
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	05	0.2	15
			Minor repair	Major repair	Major repair Maintain pipes	Check/maintain network Check/maintain meter			
					Manitani pipes	Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	51	0.2	10.2
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	75	0.2	15
~43					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_i$		1	68.2
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	70	0.14	10
C52	Market incentives	None	Low	Medium	High	Very high	51	0.14	7.285714
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	70	0.14	10
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	81	0.14	11.57143
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	70	0.14	10
				Equipment	Equipment	Equipment			
~					Cash	Cash - Stocks			7 00
- 50	Investment activities	None	Low	Medium	High	Very High	51	0.14	7.285714
C57		Very High	High	Medium	Low	None	65	0.14	
15	Score Economical and Financial Capac Energy Capacity	ny l				$\sum C_{ij} w_j$		1	65.42857
	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	90	0.25	22.5
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	90 70	0.25	17.5
	Dependence for service	Very low	Low	Medium	High	Very High	60	0.25	17.5
C ₆₃	Outage rate	Very High	High	Medium	Low	Very low	51	0.25	12.75
-04	Score Energy Capacity	,	3			$\sum C_{ii} w_i$	51	1	67.75
7	Environmental and Ecological Capacity	,							
	Environment quality	Very low	Low	Medium	High	Very high	50	0.2	10
	Size of resource system	Very low	Low	Medium	High	Very high	70	0.2	14
	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	75	0.2	15
C ₇₃		Very Negat	Negative	Stable	Positive	Very Positive	50	0.2	10
	Growth or replacement rate		Low	Medium	High	Very High	65	0.2	13
C ₇₄	Growth or replacement rate Resource sensibility	Very low	Low						62
C ₇₄ C ₇₄	Resource sensibility Score Environmental Capacity	Very low	LOW			$\sum C_{ij} w_j$		1	
C ₇₄ C ₇₄ f ₇ 8	Resource sensibility Score Environmental Capacity Social and Cultural Capacity							1	
C ₇₄ C ₇₄ f 7 8 C ₈₁	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low	Low	Intermediate	High	Very high	65	1 0.2	13
C ₇₄ C ₇₄ f 7 8 C ₈₁ C ₈₂	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low	Low	Intermedia te Intermedia te	High	Very high Very high	85	0.2	13 17
C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂ C ₈₃	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low	Low Low Low	Intermediate Intermediate Intermediate	High High	Very high Very high Very high	85 60	0.2 0.2	13 17 12
C ₇₄ C ₇₄ f7 C ₈₁ C ₈₁ C ₈₂ C ₈₃ C ₈₄	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	Very low Very low Very low Very low	Low Low Low Low Low	Intermediate Intermediate Intermediate Intermediate	High High High	Very high Very high Very high Very high	85 60 45	0.2 0.2 0.2	13 17 12 9
C ₇₄ C ₇₄ f7 C ₈₁ C ₈₁ C ₈₂ C ₈₃ C ₈₄	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low	Low Low Low	Intermediate Intermediate Intermediate	High High	Very high Very high Very high	85 60	0.2 0.2	13 17 12

Appendix II.A: Technology Capacity Level Scores – CPWSS

_		PP			Capacity Leve				
	Capacity Factors	1-20	21-40	41-60	ned Scoring 61-80	81-100	Score	Woight	CF score
1	Service Capacity	1-20	21-40	41-00	01-80	81-100	JUIE	weight	CF SCOTE
C ₁₁	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	50	1	50
f ₁	Score Service Capacity					$\sum C_{ii} w_i$		1	50
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	61	0.1667	10.16667
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	61	0.1667	10.16667
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	72	0.1667	12
C25	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	21	0.1667	3.5 62.83333
2	Score Institutional Capacity Human Resources Capacity (service pr	ovider)				$\sum C_{ij} w_j$		1	62.83333
	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	60	0.2	12
-31		None	Hone	Health Scientist	Health Scientist	Health Scientist		0.2	
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant Water meter leader	Administratrive assistant			
					water meter redder	Water meter leader IT technician			
Cas	Unskilled Labor	Craftsman	Clerk	Clerk			81	0.2	16.2
-33		2. a. comuli	Mechanic assistant	Water meter reader			01	0.2	10.2
-				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				91	0.2	18.2
C35	Access to Higher Education	None	State	Regional	District	Mandal	71	0.2	14.2
f ₃	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	72.6
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	85	0.2	17
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
C42	Maintenance	None	Closp water systems	Chack water systems	Check/maintain water systems	Monitor Treatment Check/maintain water systems	75	0.2	15
-42	Maintenance	None	Clean water systems Minor repair	Check water systems Major repair	Major repair	Check/maintain network	/5	0.2	15
_			Willion repair	Majorrepan	Maintain pipes	Check/maintain meter			
-						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	41	0.2	8.2
C45	Maintenance network	None	State	District	Mandal	Habitational	70	0.2	14
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	81	0.2	16.2
					District Approved	District Approved			
4	Score Technical Capacity					$\sum C_{ij} w_i$		1	70.4
-	Economical and Financial Capacity		a		o				10
	Private sector investment Market incentives	None	State	Regional	District	Mandal	70	0.14	10 7.285714
C ₅₂ C ₅₃	User fees	None None	Low Uniform flat rate	Medium Single block rate	High Increasing block rate	Very high Increasing block rate	51 70	0.14	10
	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	81	0.14	11.57143
	Asset values	None	Real Estate	Real estate	Real estate	Real estate	70	0.14	11.571.15
- 55				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	Cash High	Cash - Stocks Very High	51	0.14	7.285714
	Loss to corruption	Very High		Medium Medium		Very High None	51 65	0.14 0.14	9.285714
C57 f 5	Loss to corruption Score Economical and Financial Capac	Very High			High	Very High			
C ₅₇ fs 6	Loss to corruption Score Economical and Financial Capac Energy Capacity	Very High ity	High	Medium	High Low	Very High None $\sum C_{ij} w_j$	65	0.14 1	9.285714 65.42857
C ₅₇ fs 6 C ₆₁	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source	Very High ity None	High Non-conventional	Medium Conventional electricity	High Low Electricity mid-voltage	Very High None $\sum C_{ij} w_j$ Electricity high voltage	65 90	0.14 1 0.25	9.285714 65.42857 22.5
C ₅₇ f ₅ 6 C ₆₁ C ₆₂	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	High Low Electricity mid-voltage Generator < 50 HP	Very High None ∑C _{ij} w _j Electricity high voltage Generator > 50 HP	65 90 71	0.14 1 0.25 0.25	9.285714 65.42857 22.5 17.75
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	Very High ity None None Very Iow	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	High Low Electricity mid-voltage Generator < 50 HP High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	65 90 71 50	0.14 1 0.25 0.25 0.25	9.285714 65.42857 22.5 17.75 12.5
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption <u>Score Economical and Financial Capac</u> Energy Capacity Primary source Alternative source Dependence for service Outage rate	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	High Low Electricity mid-voltage Generator < 50 HP	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	65 90 71	0.14 1 0.25 0.25	9.285714 65.42857 22.5 17.75
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	Very High ity None None Very Iow Very High	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	High Low Electricity mid-voltage Generator < 50 HP High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	65 90 71 50	0.14 1 0.25 0.25 0.25	9.285714 65.42857 22.5 17.75 12.5 17.5
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	Very High ity None None Very Iow Very High	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	High Low Electricity mid-voltage Generator < 50 HP High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	65 90 71 50	0.14 1 0.25 0.25 0.25	9.285714 65.42857 22.5 17.75 12.5 17.5
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	Very High ity None None Very low Very High	High Non-conventional None Low High	Medium Conventional electricity Generator < 10 HP Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very Jow $\sum C_{ij} w_j$	65 90 71 50 70 0 0 80 70	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25 70.25 16 16
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_6 T C_{71} C_{72} C_{73}	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	Very High ity None None Very Iow Very High Very Iow	High Non-conventional None Low High Low	Medium Conventional electricity Generator < 10 HP Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high	65 90 71 50 70 80	0.14 1 0.25 0.25 0.25 0.25 1 0.25 1	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25 70.25 16 16 14
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Negati	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive	65 90 71 50 70 80 70 50 70 50 75	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 70.25 70.25 70.25 16 14 10 15
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High ity None None Very Iow Very High Very High Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very Positive Very High	65 90 71 50 70 80 70 50	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25 70.
C_{57} f_3 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Dutage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Negati	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive	65 90 71 50 70 80 70 50 70 50 75	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 70.25 70.25 70.25 16 14 10 15
C_{57} f_{5} G_{61} C_{62} C_{63} C_{64} f_{6} T C_{71} C_{71} C_{72} C_{73} C_{74} f_{7} g	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very High ity None None Very Iow Very High Very Iow Very Iow Very New Very New Very New Very New Very New Very Iow	High Non-conventional None Low High Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_j$	65 90 71 50 70 70 80 70 50 75 65	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 70.25 70.25 70.25 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.
C ₅₇ f ₅ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₄ C ₇₄ C ₇₄ C ₇₄ f ₇ 8 C ₈₁	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Social and Cutural Capacity Communal ownership	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very Positive Very High $\sum C_{ij} w_j$	65 90 71 50 70 80 70 50 75 65 65 85	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.25 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26 70.26
C_{57} f_5 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} C_{74} C_{74} C_{74} C_{81} C_{82}	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capadity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Political stability	Very High ity None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High Positive High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very High Very High Very High Very High Very High	65 90 71 50 70 80 70 50 75 65 65 80 85 65	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25 14 14 10 15 13 68 68 17 12
C_{57} f_5 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} C_{74} f_7 C_{74} C_{75} C	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cutural Capacity Communal ownership Political stability Equity	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Very Very Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very High $\sum C_{ij} w_j$ Very High Very High Very High Very high Very high	65 90 71 50 70 80 70 50 75 65 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25
C ₅₇ f ₅ 6 C ₆₁ C ₆₂ C ₆₄ f ₆ 7 C ₇₁ C ₇₁ C ₇₁ C ₇₁ C ₇₁ C ₇₄ f ₇ 8 C ₈₁ C ₈₃ C ₈₄	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capadity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Political stability	Very High ity None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High Positive High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very High Very High Very High Very High Very High	65 90 71 50 70 80 70 50 75 65 65 80 85 65	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 65.42857 22.5 17.75 12.5 17.5 70.25 14 14 10 15 13 68 68 17 12

Appendix II.B: Technology Capacity Level - PWSS

			Partitio	ned Scoring				
Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
Service Capacity								
Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	30	1	30
Score Service Capacity					$\sum C_{ij} w_j$		1	30
Institutional Capacity								
Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
Operational rules	None	Basic	Intermediate	Complete	Advanced	41	0.1667	6.833333
Administrative agencies	None	State	District	Mandal	Habitational	41	0.1667	6.833333
Administrative processes	None	Basic	Intermediate	Complete	Advanced	41	0.1667	6.833333
Governance	None	State	District	Mandal	Habitational	85	0.1667	14.16667
Presence of NGOs	None	Low	Medium	High	Very High	70	0.1667	11.66667
Score Institutional Capacity				-	$\sum C_{ij} w_j$		1	54.66667
Human Resources Capacity (service pr	rovider)							
Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	60	0.2	12
			Health Scientist	Health Scientist	Health Scientist			
				Engineer	Engineer			
				-	Lawyer			
					Public relations manager			
Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
			Laboratory technician	Laboratory technician	Laboratory technician			
			Water systems operator	Water systems operator	Water systems operator			
			in a systems operator	Health Inspector	Health Inspector			
				Administratrive assistant	Administratrive assistant			
				Water meter leader	Water meter leader			
					IT technician			
Unskilled Labor	Craftsman	Clerk	Clerk		in teenineran	81	0.2	16.2
	cransman	Clerk Mechanic assistant				81	0.2	10.2
		wechanic assistant	Water meter reader					
Illiterate	Carotalia	Caratakar	Water systems worker					10.2
Illiterate	Caretaker None	Caretaker State	Pogional	District	Mandal	91 71	0.2	18.2 14.2
Access to Higher Education	None	state	Regional	District		/1	0.2	
Score Human Resources Capacity					$\sum C_{ij} w_j$		1	72.6
Technical Capacity								40
Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	60	0.2	12
			Control Water Quality	Control Water Quality	Control Water Quality			
				Control Pipes	Monitor pipes network			
					Monitor Treatment			
Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	80	0.2	16
		Minor repair	Major repair	Major repair	Check/maintain network			
				Maintain pipes	Check/maintain meter			
					Maintain IT systems			
Adaptation	None	Rarely	Occasionally	Usually	Frequently	50	0.2	10
Maintenance network	None	State	District	Mandal	Habitational	90	0.2	18
Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	45	0.2	9
				District Approved	District Approved			
Score Technical Capacity					$\sum C_{ij} w_j$		1	65
Economical and Financial Capacity								
Private sector investment	None	State	Regional	District	Mandal	80	0.14	11.42857
Market incentives	None	Low	Medium	High	Very high	71	0.14	10.14286
User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	31	0.14	4.428571
Asset values	None	Real Estate	Real estate	Real estate	Real estate	55	0.14	7.857143
			Equipment	Equipment	Equipment			
				Cash	Cash - Stocks			
Investment activities	None	Low	Medium	High	Very High	55	0.14	7.857143
		High	Medium	Low	None	55	0.14	
Converting the second sec	ite .				50		1	55.28571
Score Economical and Financial Capac	ny				$\sum C_{ij} w_i$			
Energy Capacity								
	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	50	0.25	12.5
Energy Capacity Primary source Alternative source		Non-conventional None	Conventional electricity Generator < 10 HP	Electricity mid-voltage Generator < 50 HP		50 40	0.25	10
Energy Capacity Primary source	None None Very low	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Electricity high voltage Generator > 50 HP Very High	40 50	0.25 0.25	10 12.5
Energy Capacity Primary source Alternative source	None None	None	Generator < 10 HP	Generator < 50 HP	Electricity high voltage Generator > 50 HP	40	0.25	10
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None None Very Iow Very High	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Electricity high voltage Generator > 50 HP Very High	40 50	0.25 0.25	10 12.5
Energy Capacity Primary source Alternative source Dependence for service Outage rate	None None Very Iow Very High	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Electricity high voltage Generator > 50 HP Very High Very low	40 50	0.25 0.25	10 12.5 10.25
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None None Very Iow Very High	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Electricity high voltage Generator > 50 HP Very High Very low	40 50	0.25 0.25	10 12.5 10.25
Energy Capacity Primary source Alternative source Dependence for service Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity	None None Very Iow Very High	None Low High	Generator < 10 HP Medium Medium	Generator < 50 HP High Low	Electricity high voltage Generator > 50 HP Very High Very I ow <u>ΣC₁ w_j</u>	40 50 41	0.25 0.25 0.25 1	10 12.5 10.25 45.25
Energy Capacity Primary source Alternative source Dependence for service Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality	None None Very Iow Very High Very Iow	None Low High Low	Generator < 10 HP Medium Medium Medium	Generator < 50 HP High Low High	Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high	40 50 41 81	0.25 0.25 0.25 1 0.2	10 12.5 10.25 45.25 16.2
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None None Very Iow Very High Very Iow Very Iow	None Low High Low Low	Generator < 10 HP Medium Medium Medium Medium	Generator < 50 HP High Low High High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	40 50 41 81 50	0.25 0.25 0.25 1 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	None None Very Iow Very High Very Iow Very Iow Very Iow	None Low High Low Low Low	Generator < 10 HP Medium Medium Medium Medium Medium	Generator < 50 HP High Low High High High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high	40 50 41 81 50 70	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10 14
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Negati	None Low High Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive	40 50 41 81 50 70 60	0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10 14 12 16
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Negati	None Low High Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High	40 50 41 81 50 70 60	0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10 14 12 16
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None None Very low Very High Very low Very low Very low Very low	None Low High Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High	40 50 41 81 50 70 60	0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10 14 12 16 68.2
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	None None Very Iow Very High Very Iow Very Iow Very Nega ti Very Iow Very Iow	None Low High Low Low Low Negative Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	Generator < 50 HP High Low High High High Positive High High	Electricity high voltage Generator > 50 HP Very High Very How $\sum C_{ij} w_j$ Very high Very high Very High Very High $\sum C_{ij} w_j$ Very high	40 50 41 81 50 70 60 80 80 80	0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	100 12.5 10.25 45.25 16.2 100 144 122 166 68.2 166 166
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None None Very low Very High Very low Very low Very low Very low Very low Very low Very low	None Low High Low Low Low Low Negative Low Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Generator < 50 HP High Low High High High Positive High High High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_i$ Very high Very high Very high	40 50 41 50 81 50 70 60 80 80 80 60	0.25 0.25 0.25 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2	10 12.5 10.25 45.25 16.2 10 14 12 16 68.2
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Communal ownership Political stability Equity Equity	None None Very low Very High Very low Very low Very low Very low Very low Very low Very low Very low	None Low High Low Low Low Low Low Low Low Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Generator < 50 HP High Low High High High Positive High High High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} v_j$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	40 50 41 81 50 70 60 80 80 60 60 60	0.25 0.25 0.25 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	10 12.5 45.25 10.25 45.25 16.2 10 14 14 12 16 68.2 16 6 8.2 16 12
Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None None Very low Very High Very low Very low Very low Very low Very low Very low Very low	None Low High Low Low Low Low Negative Low Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Generator < 50 HP High Low High High High Positive High High High	Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_i$ Very high Very high Very high	40 50 41 50 81 50 70 60 80 80 80 60	0.25 0.25 0.25 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2	10 12.5 45.25 10.25 45.25 16.2 10 14 12 16 68.2 16 12

Appendix II.C: Technlogy Capacity Level – RHS

Appendix III.A: Policy Capacity Grade – CPWSS

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix III.B: Policy Capacity Grade – Proliferation of PWSS

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix III.C: Policy Capacity Grade – Proliferation of RWS

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	65	1	65
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	65
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	70	0.1667	11.66667
C23	Administrative agencies	None	State	District	Mandal	Habitational	70	0.1667	11.66667
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	70	0.1667	11.66667
C ₂₅	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	45	0.1667	7.5
f ₂	Score Institutional Capacity					$\sum C_{ij} w_j$		1	66.83333
3	Human Resources Capacity (service p	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	85	0.2	17
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	65	0.2	13
				Laboratory technician	Laboratory technician	Laboratory technician	I		
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector	I		
					Administratrive assistant	Administratrive assistant	I		
					Water meter leader	Water meter leader	I		
~						IT technician	-	-	
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			85	0.2	17
			Mechanic assistant	Water meter reader					
~	11114	C	Constals	Water systems worker				-	
	Illiterate	Caretaker	Caretaker				95	0.2	19
C35	Access to Higher Education	None	State	Regional	District	Mandal	85	0.2	17
t3 -	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	83
_	Technical Capacity			a i wi i			70		14
C ₄₁	Operations	water Use	Pumping Water	Pumping Water Control Water Quality	Monitor water systems	Monitor water systems	70	0.2	14
				Control water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
C		Neze	Cl	Charles and a sector	Charly (and in the instant of the state	Monitor Treatment	70	0.2	14
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	70	0.2	14
			Minor repair	Major repair	Major repair Maintain pipor	Check/maintain network Check/maintain meter			
					Maintain pipes	Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	75	0.2	15
	Maintenance network	None	State	District	Mandal	Habitational	70		13
	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	85	0.2	14
C45	Distribution network	NOTE	Regional Supplier	District Supprier	District Approved	District Approved	- 05	0.2	1/
e.	Score Technical Capacity				bistiterippiorea	$\sum C_{ij} w_i$		1	74
5	Economical and Financial Capacity					<u></u>		-	/-
-	Private sector investment	None	State	Regional	District	Mandal	75	0.14	10.71429
	Market incentives	None	Low	Medium	High	Very high	70	0.14	10/11/20
	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	50	0.14	7.142857
	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	60	0.14	8.571429
	Asset values	None	Real Estate	Real estate	Real estate	Real estate	70	0.14	10
				Equipment	Equipment	Equipment	1	1	
					Cash	Cash - Stocks	1		
C56	Investment activities	None	Low	Medium	High	Very High	60	0.14	8.571429
		Very High		Medium	Low	None	70		
fs	Score Economical and Financial Capac					$\sum C_{ij} w_j$		1	65
6	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	75	0.25	18.75
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	75	0.25	18.75
	Dependence for service	Very low	Low	Medium	High	Very High	80	0.25	20
	Outage rate	Very High	High	Medium	Low	Very low	50	0.25	12.5
	Outagerate					$\sum C_{ij} w_j$		1	70
C ₆₄ f6	Score Energy Capacity								1
C ₆₄ f6		(
C ₆₄ f ₆ 7	Score Energy Capacity	Very low	Low	Medium	High	Very high	40		
C ₆₄ f ₆ 7 C ₇₁ C ₇₂	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system		Low Low	Medium Medium	High High		40 50	0.2	10
C ₆₄ f ₆ 7 C ₇₁ C ₇₂	Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very low				Very high	50 60	0.2	10 12
C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very low Very low Very low Very Negati	Low Low	Medium	High High Positive	Very high Very high Very high Very Positive	50 60 41	0.2 0.2 0.2	10
C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	Very low Very low Very low	Low Low	Medium Medium	High High	Very high Very high Very high	50 60	0.2 0.2 0.2	10 12
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 6	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very low Very low Very low Very Negati	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive	50 60 41	0.2 0.2 0.2	10 12
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 6	Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very low Very low Very low Very Negati	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive Very High	50 60 41	0.2 0.2 0.2	10 12 8.2 9 47.2
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 8	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very low Very low Very low Very Negati	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive Very High	50 60 41	0.2 0.2 0.2 0.2 1	10 12 8.2 9 47.2
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 8 C ₈₁ C ₈₂	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very low Very low Very low Very Negati Very low	Low Low Negative Low	Medium Medium Stable Medium	High High Positive High	Very high Very high Very high Very Positive Very High ΣC _{ij} w _j	50 60 41 45 55 61	0.2 0.2 0.2 1 0.2 1 0.2 0.2	10 12 8.2 9 47.2 11 11 12.2
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 8 C ₈₁ C ₈₂	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low Very low Very low Very Negati Very low Very low	Low Low Negative Low Low	Medium Medium Stable Medium Intermediate	High High Positive High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	50 60 41 45 55	0.2 0.2 0.2 1 0.2 1 0.2 0.2	10 12 8.2 9 47.2
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 8 C ₈₁ C ₈₂ C ₈₃ C ₈₃	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low Very low Very Negati Very low Very low Very low	Low Low Negative Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	50 60 41 45 55 61	0.2 0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	10 12 8.2 9 47.2 11 12.2 12
C ₆₄ 7 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ 7 8 C ₈₁ C ₈₁ C ₈₂ C ₈₃ C ₈₃	Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very hositi ve Very High $\sum C_{ij} w_j$ Very high Very high Very high	50 60 41 45 55 61 60	0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	10 12 8.2 9 47.2 11 12.2 12 13

Appendix IV.A.1: Bhongir Mandal – Bhongir Municipality

Partitioned Scoring 41-60 Capacity Factors 1-20 21-40 61-80 81-100 core Weight CF score 1 Service Capacity 60 - 80 l/p/d 80 l/p/d 20 - 40 l/p/d 40 - 60 l/p/d 40 ffective service level 20 l/p/d 40 40 $C_{ii}v$ 2 Institutional Capacity Intermediate Advanced 50 0.1667 8.333333 Body of legislation Basic Complete None Operational rules Basic ntermediate Complete Advanced 50 0.1667 8.333333 lone Administrative agencies District Habitational 0.1667 State Mandal 60 None 1(Administrative processes 50 0.1667 8.333333 Basic Intermediate Complete Advanced None 0.1667 10.16667 Governance District Mandal Habitational 61 None State Presence of NGOs Medium Verv High 25 0.1667 4.166667 lone Low High 49.33333 ore Institutional C $\sum C_{ij} w$ 3 Human Resources Capacity (service provider) Administrative manage Administrative manager Professionals None None Administrative supervisor 45 0.2 Health Scientist Health Scientist Health Scientist Ingineer Engineer Lawyer Public relations manager C₃₂ Skilled Labor None Mechanic Maintenance technician Maintenance technician Maintenance technician 40 0.2 Laboratory technician aboratory technician Laboratory technician Water systems operator Water systems operator Water systems operator Health Inspector Health Inspector Administratrive assistant Administratrive assistant Water meter leade Water meter leader T technician Unskilled Labor Craftsman Clerk Clerk 75 0.2 15 Mechanic assistant Water meter reader Water systems worker C₃₄ Illiterate Caretaker Caretake 75 0.2 15 Access to Higher Education Mandal 81 16.2 State egional District 0.2 lone C ...w 63.2 ore Human 4 Technical Capacity 40 Operations Water Use Pumping Water Pumping Water Monitor water systems Monitor water systems 0.2 Control Water Quality Control Water Quality Control Water Quality Control Pipes Monitor pipes network Monitor Treatment C42 Maintenance Check/maintain water systems 40 None Clean water systems Check water systems Check/maintain water systems 0.2 Minor repair Major repair Maior repair Check/maintain network Maintain pipes Check/maintain meter Maintain IT systems C43 Adaptation lone Rarely Occasionally Usually Frequently 40 0.2 Maintenance network lone State District Mandal Habitational 75 0.2 15 81 Distribution network lone Regional Supplier District Supplier Mandal Supplier Habitational Supplier 0.2 16.2 District Approved District Approved 55.2 $\sum C_{ij} w$ 5 Economical and Financial Capacity Private sector investment State Regional District Mandal 8 0.14 11.57143 lone . Medium Market incentives one High Very high 30 0.14 4 285714 User fees Uniform flat rate Single block rate ncreasing block rate Increasing block rate 40 5.714286 lone 0.14 Budget lone Basic accounting Annual Tracked bi-annually Tracked quarterly 40 0.14 5.714286 Asset value Real Estate Real estate Real estate Real estate 50 7.142857 0.14 Equipment Equipment Equipment Cash - Stocks Cash 5.714286 C₅₆ Investment activities Medium High Very High 40 0.14 None Low 50 7.142857 Loss to corruption Very High High Medium None 0.14 Low $C_{ij}w$ 47.28571 6 Energy Capacity Conventional electricity Electricity mid-voltage Electricity high voltage 18.75 Non-conventional 0.25 Primary source None 75 50 0.25 Generator < 50 HP 12.5 Alternative source Generator < 10 HP Generator > 50 HP None None Dependence for service Very low Low Medium High Very High 40 0.25 10 50 0.25 12.5 Outage rate /erv High High Medium .ow Verv low 53.75 ore Enerav C ...w 7 Environmental and Ecological Capacity 10 Environment quality /ery low Medium High Very high 50 0.2 Low Size of resource system /erv low Low Medium High Verv high 45 0.2 Predictability of resource dynamics Very low Low Medium High Very high 25 0.2 Growth or replacement rate /ery Negat Negative Stable Positive Very Positive 45 0.2 Resource sensibility /erv low Medium ligh Very High 50 0.2 10 $\sum C_{ij} w$ 43 ore Enviro 8 Social and Cultural Capacity 10 Communal ownership ery low Intermediate High Very high 50 0.2 Low Political stability ery low ntermediate ligh Very high 85 0.2 17 Low /ery low ntermediate Very high 60 12 Equity Low High 0.2 .eadership/entrepreneurship ntermediate Very high 55 0.2 11 Very low Low High articipation of women ntermediate Very high 55 0.2 11 ery low Low High 61

Appendix IV.A.2: Bhongir Mandal – Banda Samaram

Appendix IV.A.3: Bhongir Mandal – Raigiri

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	40	1	40
i_{1}	Score Service Capacity					$\sum C_{ij} w_j$		1	40
	Institutional Capacity								
	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	60	0.1667	10
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	61	0.1667	10.16667
2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	60.33333
	Human Resources Capacity (service pr		N				64	0.2	12.2
C ₃₁	Professionals	None	None	Administrative supervisor Health Scientist	Administrative manager Health Scientist	Administrative manager	61	0.2	12.2
_				Health Scientist	Engineer	Health Scientist			
_					ciigineer	Engineer Lawyer			
_									
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Public relations manager Maintenance technician	55	0.2	11
-32	Skined Labor	None	Wieename	Laboratory technician	Laboratory technician	Laboratory technician	55	0.2	
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			75	0.2	15
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				75	0.2	15
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
13	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	69.4
4	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	45	0.2	9
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	65	0.2	13
~	Course Technical Courseits				District Approved	District Approved			F1
4	Score Technical Capacity Economical and Financial Capacity					$\sum C_{ij} w_j$		1	51
	Economical and Financial Capacity								
	Drivate center investment	None	State	Degional			65	0.14	0 295714
C51	Private sector investment	None	State	Regional	District	Mandal Vory bigh	65	0.14	9.285714
C ₅₁ C ₅₂	Market incentives	None	Low	Medium	High	Very high	45	0.14	6.428571
C ₅₁ C ₅₂ C ₅₃	Market incentives User fees	None None	Low Uniform flat rate	Medium Single block rate	High Increasing block rate	Very high Increasing block rate	45 30	0.14 0.14	6.428571 4.285714
C ₅₁ C ₅₂ C ₅₃ C ₅₄	Market incentives User fees Budget	None	Low	Medium	High	Very high	45	0.14	6.428571 4.285714 5.714286
C ₅₁ C ₅₂ C ₅₃ C ₅₄	Market incentives User fees	None None None	Low Uniform flat rate Basic accounting	Medium Single block rate Annual Real estate	High Increasing block rate Tracked bi-annually	Very high Increasing block rate Tracked quarterly	45 30 40	0.14 0.14 0.14	6.428571 4.285714
C ₅₁ C ₅₂ C ₅₃ C ₅₄	Market incentives User fees Budget	None None None	Low Uniform flat rate Basic accounting	Medium Single block rate Annual	High Increasing block rate Tracked bi-annually Real estate	Very high Increasing block rate Tracked quarterly Real estate	45 30 40	0.14 0.14 0.14	6.428571 4.285714 5.714286
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅	Market incentives User fees Budget	None None None	Low Uniform flat rate Basic accounting	Medium Single block rate Annual Real estate	High Increasing block rate Tracked bi-annually Real estate Equipment	Very high Increasing block rate Tracked quarterly Real estate Equipment	45 30 40	0.14 0.14 0.14	6.428571 4.285714 5.714286
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅	Market incentives User fees Budget Asset values Investment activities	None None None None	Low Uniform flat rate Basic accounting Real Estate Low	Medium Single block rate Annual Real estate Equipment	High Increasing block rate Tracked bi-annually Real estate Equipment Cash	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks	45 30 40 55	0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅	Market incentives User fees Budget Asset values Investment activities	None None None None Very High	Low Uniform flat rate Basic accounting Real Estate Low	Medium Single block rate Annual Real estate Equipment Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High	45 30 40 55 55	0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 7.857143
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅	Market incentives User fees Budget Asset values Investment activities Loss to corruption	None None None None Very High	Low Uniform flat rate Basic accounting Real Estate Low	Medium Single block rate Annual Real estate Equipment Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None	45 30 40 55 55	0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 7.857143 8.571429
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅ C ₅₆ C ₅₇ f ₅ 6	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capaco	None None None None Very High	Low Uniform flat rate Basic accounting Real Estate Low	Medium Single block rate Annual Real estate Equipment Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None	45 30 40 55 55	0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 7.857143 8.571429
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{57} f_5 C_{61} C_{62}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac. Energy Capadty Primary Source Alternative source	None None None None Very High ity None None	Low Uniform flat rate Basic accounting Real Estate Low High	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$	45 30 40 55 55 60 60 65 55	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25	6.428571 4.285714 5.714286 7.857143 7.857143 8.571429 50 16.25 13.75
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{57} f_5 C_{61} C_{62} C_{63}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capadity Primary source Alternative source Dependence for service	None None None None Very High ity None None Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	45 30 40 55 55 60 65 55 65	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 7.857143 8.571429 50 16.25 13.75 16.25
C_{51} C_{52} C_{53} C_{54} C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capadity Primary source Alternative source Dependence for service Outage rate	None None None None Very High ity None None	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High	45 30 40 55 55 60 60 65 55	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None None None Very High Very High None None Very Iow Very High	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	45 30 40 55 55 60 65 55 65	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 7.857143 8.571429 50 16.25 13.75 16.25
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} 7	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None None None None Very High None Very Iow Very High	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$	45 30 40 55 55 60 65 55 65 45	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 1	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5
C_{51} C_{52} C_{53} C_{54} C_{55} C_{57} C_{57} C_{57} C_{61} C_{62} C_{63} C_{64} f_{6} T C_{71}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None None None None Very High ity None None Very Iow Very High	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very Iow $\sum C_{ij} w_j$ Very high	45 30 40 55 55 60 65 55 65 45 55 55	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None None None Very High Ity None None Very Iow Very Iow Very High Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low	Medium Single block rate Annual Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	45 30 40 55 55 60 65 55 65 65 65 65 65 65 65 65 65 65 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 11.25 57.5 11.25 57.5 111
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	None None None Very High ity None Very low Very low Very low Very low Very low	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Medium Single block rate Annual Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{IJ} w_J$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high	45 30 40 55 55 60 65 55 65 65 65 65 65 65 65 65 65 65 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 16.25 11.25 57.5 11.25 57.5 11.25
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{55} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None None None Very High Iv None Very High Very How Very How Very How Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low	Medium Single block rate Annual Real estate Equipment Medium Medium Medium Medium Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive	45 30 40 55 55 60 65 55 65 65 45 45 55 45 50 45	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 57.5 9 11.25 57.5 9 11.2 5 9 9 100 9 9
C_{51} C_{52} C_{53} C_{54} C_{55} C_{55} C_{55} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74}	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None None None Very High ity None Very low Very low Very low Very low Very low	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Medium Single block rate Annual Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	45 30 40 55 55 60 65 55 65 65 65 65 65 65 65 65 65 65 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 57.5 9 10 9 10 9 10
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅ C ₅₇ C ₅₇ C ₅₇ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₆₄ C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None None None Very High Iv None Very High Very How Very How Very How Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low	Medium Single block rate Annual Real estate Equipment Medium Medium Medium Medium Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very ligh Very high Very high Very high Very high Very Positive	45 30 40 55 55 60 65 55 65 65 45 45 55 45 50 45	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 57.5 57.5 9 10.00 9 9 100 9 9
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅ C ₅₇ C ₅₅ C ₅₇ C ₅₇ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₇₁ C ₇₂ C ₇₄ C ₇₄ C ₇₄ S	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Informental Capacity Social and Cultural Capacity	None None None Very High Ity None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low	Medium Single block rate Annual Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$	45 30 40 55 55 65 55 65 55 55 55 55 55 55 55 50 45 50	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 16.25 11.25 57.5 11.25 57.5 11.25 57.5 10.25 11.25 57.5 11.25 57.5 10.00 9 00 9 00 9 9
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅ C ₅₇ C ₅₅ C ₅₁ C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₆₄ C ₇₁ C ₇₂ C ₇₄ C ₇₄ C ₇₄ C ₇₄	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environment Capacity Scola and Cutural Capacity Communal ownership	None None None Very High Ity None None Very Iow Very High Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low	Medium Single block rate Annual Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High	45 30 40 55 55 55 65 55 65 65 65 65 65 65 65 65	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.14	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 57.5 9 10.0 9 9 0 10 9 9 100 9 9
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₅ C ₅₁ C ₅₅ C ₆₁ C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₆₄ C ₇₁ C ₇₂ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environment (Capacity Score Invironment (Capacity Score Senvironment (Capacity Communal ownership Political stability	None None None Very High Iv None Very High Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Negative Low	Medium Single block rate Annual Real estate Equipment Medium Medium Medium Medium Medium Medium Medium Stable Medium Stable Medium Intermediate Intermediate	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High Very High Very High Very High Very High Very High Very High Very High Very high Very high	45 30 40 55 55 60 65 55 65 45 55 55 45 50 45 50 45 50 45 50 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 7.857143 8.571429 50 7.857143 8.571429 50 7.857143 7.85714 7.85
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₆ C ₆₁ C ₆₁ C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Scotal and Cultural Capacity Communal ownership Political stability Equity	None None None Very High Very High None Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low	Medium Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium Medium	High Increasing block rate Icow Icow Icow Icow Icow Icow Icow Icow	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High Very high	45 30 40 55 60 65 55 65 65 65 65 65 65 45 50 45 50 45 50 45 50 60	0.14 0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 11.25 57.5 10.25 11.25 57.5 10.25 11.25 57.5 9 0 0 9 9 100 9 9 100 9 9 100 9 9 100 9 9 100 9 9 100 9 9 100 9 9 100 100
C ₅₁ C ₅₂ C ₅₃ C ₅₄ C ₅₅ C ₅₇ C ₆₁ C ₆₁ C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ C ₆₄ f ₇ C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₅ C ₇₅ C C ₇₅ C C ₇₅ C C ₇₅ C C C ₇₅ C C	Market incentives User fees Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environment (Capacity Score Invironment (Capacity Score Senvironment (Capacity Communal ownership Political stability	None None None Very High Iv None Very High Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Negative Low	Medium Single block rate Annual Real estate Equipment Medium Medium Medium Medium Medium Medium Medium Stable Medium Stable Medium Intermediate Intermediate	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High Very High Very High Very High Very High Very High Very High Very High Very high Very high	45 30 40 55 55 60 65 55 65 45 55 55 45 50 45 50 45 50 45 50 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	6.428571 4.285714 5.714286 7.857143 8.571429 50 16.25 13.75 16.25 11.25 57.5 57.5 9 10.0 9 9 0 10 9 9 100 9 9

Appendix	IV.A.4	: Bhongiı	· Mandal –	- Kesaram
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				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	35	1	35
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	35
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
C ₂₅	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C26	Presence of NGOs	None	Low	Medium	High	Very High	15	0.1667	2.5
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	43.33333
3	Human Resources Capacity (service p	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	45	0.2	9
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	40	0.2	8
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C ₃₃	Unskilled Labor	Craftsman		Clerk			60	0.2	12
			Mechanic assistant	Water meter reader					
				Water systems worker					
	Illiterate	Caretaker	Caretaker				60	0.2	12
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	57.2
	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
	Adaptation	None	Rarely	Occasionally	Usually	Frequently	25	0.2	5
	Maintenance network	None	State	District	Mandal	Habitational	61	0.2	12.2
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
					District Approved	District Approved			
<i>t</i> 4	Score Technical Capacity					$\sum C_{ij} w_j$		1	45.4
	Economical and Financial Capacity								7 4 40057
	Private sector investment	None	State	Regional	District	Mandal	50	0.14	7.142857
	Market incentives	None	Low	Medium	High	Very high	35	0.14	5
	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	30	0.14	4.285714
	Budget	None None	Basic accounting	Annual Beel estate	Tracked bi-annually	Tracked quarterly Real estate	30 41	0.14	4.285714 5.857143
C55	Asset values	NOTE	Real Estate	Real estate	Real estate		41	0.14	5.05/143
				Equipment	Equipment	Equipment Cash Stocks			
C	Investment estiviti	None	Low	Madium	Cash	Cash - Stocks Very High		0.4.	7.142857
	Investment activities	None	Low	Medium	High		50	0.14	
C57	Loss to corruption Score Economical and Financial Capac	Very High		Medium	Low	None	75	0.14	10.71429 44.42857
15		ny l				$\sum C_{ij} w_j$		1	44.4200/
	Energy Capacity	None	Non-conventional	Conventional electricit	Electricity mid voltage	Electricity high voltage	70	0.25	17.5
	Primary source			Conventional electricity	Electricity mid-voltage	Electricity high voltage			
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	60	0.25	15 15
	Dependence for service	Very low Very High	Low High	Medium Medium	High Low	Very High	60 55	0.25	13.75
C ₆₄	Outage rate	very High	i ngli	wedrum	LUW	Very low	55	0.25	
16	Score Energy Capacity					$\sum C_{ij} w_j$		1	61.25
7	Environmental and Ecological Correction	,			1.11 14	Very high	65	0.2	13
	Environmental and Ecological Capacity		Low	Medium				U.2	13
C ₇₁	Environment quality	Very low	Low	Medium	High			0.2	
C ₇₁ C ₇₂	Environment quality Size of resource system	Very low Very low	Low	Medium	High	Very high	55	0.2	
C ₇₁ C ₇₂ C ₇₃	Environment quality Size of resource system Predictability of resource dynamics	Very low Very low Very low	Low Low	Medium Medium	High High	Very high Very high	55 50	0.2	10
C ₇₁ C ₇₂ C ₇₃ C ₇₄	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very low Very low Very low Very Negati	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very Positive	55 50 55	0.2	10 11
C ₇₁ C ₇₂ C ₇₃ C ₇₄	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very low Very low Very low	Low Low	Medium Medium	High High	Very high Very high Very Positive Very High	55 50	0.2	10 11 8.2
C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity	Very low Very low Very low Very Negati	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very Positive	55 50 55	0.2	10 11
C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity Social and Cultural Capacity	Very low Very low Very low Very Negati Very low	Low Low Negative Low	Medium Medium Stable Medium	High High Positive High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$	55 50 55 41	0.2 0.2 0.2 1	10 11 8.2 53.2
C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Socie Anvironmental Capacity Social and Cultural Capacity Communal ownership	Very low Very low Very low Very Negati Very low Very low	Low Low Negative Low Low	Medium Medium Stable Medium Intermediate	High High Positive High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	55 50 55 41	0.2 0.2 0.2 1 0.2	10 11 8.2 53.2 11
C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Scote Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low Very low Very Negati Very low Very low Very low	Low Low Negative Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High High	Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	55 50 55 41 55 55 65	0.2 0.2 1 0.2 0.2 0.2 0.2	10 11 8.2 53.2 11 13
C_{71} C_{72} C_{73} C_{74} C_{74} f_7 g_8 C_{81} C_{82} C_{83}	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very Negati Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	55 50 55 41 55 55 65 65 60	0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	10 11 8.2 53.2 11 13 12
C_{71} C_{72} C_{73} C_{74} C_{74} f_7 8 C_{81} C_{82} C_{83} C_{84}	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	Very low Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high	55 50 55 41 55 65 65 60 60	0.2 0.2 1 0.2 0.2 0.2 0.2 0.2 0.2	10 11 8.2 53.2 11 13 12 12
C_{71} C_{72} C_{73} C_{74} C_{74} f_7 8 C_{81} C_{82} C_{83} C_{84}	Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very Negati Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	55 50 55 41 55 55 65 65 60	0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	10 11 8.2 53.2 11 13 12

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	40	1	40
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	40
	Institutional Capacity								
	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₃ C ₂₄	Administrative agencies Administrative processes	None None	State Basic	District Intermediate	Mandal Complete	Habitational Advanced	60 60	0.1667	10 10
C ₂₄ C ₂₅	Governance	None	State	District	Mandal	Habitational	75	0.1667	10
	Presence of NGOs	None	Low	Medium	High	Very High	25	0.1667	4.166667
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	55
3	Human Resources Capacity (service p	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	50	0.2	10
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	50	0.2	10
- 52				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
с.	Unskilled Labor	Craftsman	Clerk	Clerk		IT technician	75	0.2	15
C ₃₃	Unskilled Labor	Crattsman	Mechanic assistant	Water meter reader			75	0.2	15
			assistallt	Water systems worker					
C34	Illiterate	Caretaker	Caretaker				70	0.2	14
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f ₃	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	65.2
	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	65 70	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier District Approved	Habitational Supplier District Approved	70	0.2	14
£,	Score Technical Capacity				District Approved	$\sum C_{ij} w_j$		1	51
5	Economical and Financial Capacity					2÷11)			
C51	Private sector investment	None	State	Regional	District	Mandal	70	0.14	10
C52	Market incentives	None	Low	Medium	High	Very high	50	0.14	7.142857
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
C ₅₄	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	40	0.14	5.714286
C55	Asset values	None	Real Estate	Real estate	Real estate Equipment	Real estate Equipment	55	0.14	7.857143
				Equipment	Cash	Cash - Stocks			
C56		1	Low	Medium	High	Very High	50	0.14	7.142857
	Investment activities	None		wiculum	1.1.6.1				
C57	Investment activities Loss to corruption	None Very High		Medium	Low	None	60	0.14	
C57 f5	Loss to corruption Score Economical and Financial Capac	Very High						0.14 1	8.571429 52.14286
f <u>s</u> 6	Loss to corruption Score Economical and Financial Capac Energy Capacity	Very High <i>ity</i>	High	Medium	Low	None $\sum C_{ij} w_j$	60	1	52.14286
fs 6 C ₆₁	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source	Very High <i>ity</i> None	High Non-conventional	Medium Conventional electricity	Low Electricity mid-voltage	None $\sum C_{ij} w_j$ Electricity high voltage	60 70	1 0.25	52.14286 17.5
f <u>s</u> 6 C ₆₁ C ₆₂	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	Low Electricity mid-voltage Generator < 50 HP	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	60 70 45	1 0.25 0.25	52.14286 17.5 11.25
f <u>s</u> C ₆₁ C ₆₂ C ₆₃	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service	Very High ity None None Very Iow	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	Low Electricity mid-voltage Generator < 50 HP High	None <u> </u>	60 70 45 50	1 0.25 0.25 0.25	52.14286 17.5 11.25 12.5
f <u>s</u> C ₆₁ C ₆₂ C ₆₃	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	Low Electricity mid-voltage Generator < 50 HP	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	60 70 45	1 0.25 0.25	52.14286 17.5 11.25
f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service	Very High ity None None Very Iow Very High	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	Low Electricity mid-voltage Generator < 50 HP High	None <u> </u>	60 70 45 50	1 0.25 0.25 0.25	52.14286 17.5 11.25 12.5 11.25
f ₃ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very High ity None None Very Iow Very High	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	Low Electricity mid-voltage Generator < 50 HP High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	60 70 45 50	1 0.25 0.25 0.25	52.14286 17.5 11.25 12.5 11.25 52.5 52.5
f3 6 C61 C62 C63 C63 C64 f6 7 C711 C72 C72	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	60 70 45 50 45 	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 52.5 12 12 12
f3 6 C61 C62 C63 C64 f6 7 C71 C72 C73 C73	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	Very High ity None None Very low Very High Very low Very low Very low	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high	60 70 45 50 45 60 55 55	1 0.25 0.25 0.25 1 0.2 1 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 52.5 112 12 11 11
fs 6 C61 C62 C63 C64 f6 7 C71 C72 C73 C74	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow Very Iow Very Negat	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive	60 70 45 50 45 60 55 55 55 50	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 52.5 11.25 11.25 11.25 11.21 11 11
fs 6 C61 C62 C63 C64 f6 7 C71 C72 C73 C74	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High ity None None Very low Very High Very low Very low Very low	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive Very High	60 70 45 50 45 60 55 55	1 0.25 0.25 0.25 1 0.2 1 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 22.5 11 12 12 11 11 11 10 10
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow Very Iow Very Negat	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive	60 70 45 50 45 60 55 55 55 50	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 22.5 11 12 12 11 11 11 10 10
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ F C ₇₁ C ₇₁ C ₇₃ C ₇₄ C ₇₄ F 8 C	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_j$	60 70 45 50 45 60 55 55 55 50	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 22.5 11 12 12 11 11 11 10 10
fs 6 C61 C62 C63 C64 f6 7 C71 C72 C73 C74 C74 f7 8 C81	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow Very Iow Very Negat	High Non-conventional None Low High Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive Very High	60 70 45 50 45 60 55 55 50 55	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1	52.14286 17.5 11.25 12.5 11.25 52.5 11.25 1.
f3 6 C61 C62 C63 C64 f6 7 C71 C72 C73 C74 C74 F7 8 C81	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Social and Cultural Capacity Communal ownership	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	60 70 45 50 45 50 45 55 55 50 55 50 55 50 55 50	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	52.142866 17.5 11.25 12.5 11.25 52.5 7 7 7 7 7 7 7 7 7 7 7 7 7
fs 6 C61 C62 C63 C64 C64 7 C71 C72 C73 C74 C74 C74 C74 C74 C81 C82 C82 C83 C84 C84	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Comunal ownership Political stability Equity Leadership/entrepreneurship	Very High ity None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_j$ Very High Very high Very high Very high	60 70 45 50 45 50 55 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 50	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	52.14286 17.5 11.25 12.5 11.25 52.5 12 12 11 11 11 11 11 11 11 11
fs 6 C61 C62 C63 C64 C64 7 C71 C72 C73 C74 C74 C74 C74 C74 C81 C82 C82 C83 C84 C84	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very High /// None Very Iow Very High Very Iow Very Iow	High Non-conventional None Low High Cow Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High Positive High High High High	None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very High Very High $\sum C_{ij} w_j$ Very High Very high Very high Very high Very high Very high	60 70 45 50 45 60 55 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 55 50 50	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	52.14286 17.5 11.25 12.55 11.25 52.5 11.25 1

Appendix IV.A.5: Bhongir Mandal – Ramachandrapur

Appendix IV.B.1: Alair Mandal – Alair

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	30	1	30
°1	Score Service Capacity					$\sum C_{ij} w_{j}$		1	30
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	55	0.1667	9.166667
	Administrative processes	None	Basic	Intermediate	Complete	Advanced	55	0.1667	9.166667
C ₂₄	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C ₂₅									
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	35	0.1667	5.833333
2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	51.66667
3	Human Resources Capacity (service pr								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2	13
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator	1		
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant	1		
					Water meter leader	Water meter leader	1		
					trater meter reduct				
~	Unskilled labor	Crofts	Clark	Clark		IT technician	07	0.2	17
C33	Unskilled Labor	Craftsman		Clerk			85	0.2	1/
			Mechanic assistant	Water meter reader			<u> </u>		
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				85	0.2	17
C35	Access to Higher Education	None	State	Regional	District	Mandal	70	0.2	14
3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	73
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	50	0.2	10
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
					· · · · ·	Monitor Treatment			
~	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	45	0.2	c
-42	indirice indirect	None	Minor repair	Major repair	Major repair	Check/maintain network		0.2	
			мпогтеран			Check/maintain meter			
					Maintain pipes				
~						Maintain IT systems			
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C45	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
					District Approved	District Approved			
4	Score Technical Capacity					$\sum C_{ij} w_j$		1	52.2
5	Economical and Financial Capacity								
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	70	0.14	10
C52	Market incentives	None	Low	Medium	High	Very high	50	0.14	7.142857
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	40	0.14	5.714286
255 255	Asset values	None	Real Estate	Real estate	Real estate	Real estate	55	0.14	7.857143
				Equipment	Equipment	Equipment	1 33	5.14	
					Cash	Cash - Stocks	1		
~.	Invostment activities	Nono	low	Medium			45	0.14	6.428571
	Investment activities	None	Low		High	Very High		0.14	
-57		Very High	nign	Medium	Low	None	50	0.14	7.142857
5	Score Economical and Financial Capac	ty				$\sum C_{ij} w_j$	-	1	50
-	Energy Capacity						-		
261	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	75	0.25	18.75
262	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	70	0.25	17.5
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	70	0.25	17.5
264	Outage rate	Very High	High	Medium	Low	Very low	60	0.25	15
6	Score Energy Capacity					$\sum C_{ij} w_j$		1	68.75
7	Environmental and Ecological Capacity	,							
C71	Environment quality	Very low	Low	Medium	High	Very high	45	0.2	g
C72	Size of resource system	Very low	Low	Medium	High	Very high	45	0.2	9
14	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	50	0.2	10
2		Very Negati		Stable	Positive	Very Positive	45	0.2	9
C ₇₃		Very Negati Very low							9
274	Growth or replacement rate		Low	Medium	High	Very High	45	0.2	
C ₇₃ C ₇₄ C ₇₄	Resource sensibility	very tow				$\sum C_{ij} w_j$		1	46
274 274 7	Resource sensibility Score Environmental Capacity	very low							
274 274 7 8	Resource sensibility Score Environmental Capacity Social and Cultural Capacity								
274 274 7 8 281	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low	Low	Intermediate	High	Very high	60	0.2	
-74 -74 -7 -81 -82	Resource sensibility Score Environmental Capacity Social and Cultural Capacity		Low Low	Intermediate Intermediate	High High	Very high Very high	65	0.2	13
C74 C74 7	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low							13
C74 C74 7 8 C81 C82	Resource sensibility <u>Score Environmental Capacity</u> Social and Cultural Capacity Communal ownership Political stability	Very low Very low	Low	Intermediate	High	Very high	65	0.2	13 12
74 74 7 8 -81 -82 -83	Resource sensibility <u>Score Environmental Capacity</u> <u>Social and Cultural Capacity</u> Communal ownership Political stability Equity	Very low Very low Very low	Low Low	Intermediate Intermediate	High High	Very high Very high	65 60	0.2	12 13 12 12

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	35	1	35
f_{I}	Score Service Capacity					$\sum C_{ij} w_j$		1	35
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	55	0.1667	9.166667
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	55	0.1667	9.166667
C ₂₅	Governance	None	State	District	Mandal	Habitational	70	0.1667	11.66667
C26	Presence of NGOs	None	Low	Medium	High	Very High	65	0.1667	10.83333
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	62.5
3	Human Resources Capacity (service p								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	81	0.2	16.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	61	0.2	12.2
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C ₃₃	Unskilled Labor	Craftsman		Clerk			90	0.2	18
			Mechanic assistant	Water meter reader					
				Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker				85	0.2	17
C35	Access to Higher Education	None	State	Regional	District	Mandal	65	0.2	13
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	76.4
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	55	0.2	11
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	55	0.2	11
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
~						Maintain IT systems	50		10
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	50	0.2	10
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	61	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
					District Approved	District Approved			
<u>54</u>	Score Technical Capacity					$\sum C_{ij} w_j$		1	56.4
~	Economical and Financial Capacity				D 1 + 1 +				44 574 40
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
C52	Market incentives	None	Low	Medium	High	Very high	81	0.14	11.57143
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	55	0.14	7.857143
C ₅₄	Budget	None	Basic accounting	Annual Real estate	Tracked bi-annually Real estate	Tracked quarterly	55	0.14	7.857143
C55	Asset values	None	Real Estate	Real estate		Real estate	65	0.14	9.285714
				Equipment	Equipment	Equipment			
C	Investment activiti	None	Low	Madium	Cash	Cash - Stocks		0.4.4	9.285714
- 50	Investment activities	None	Low	Medium	High	Very High	65		
C57	Loss to corruption Score Economical and Financial Capac	Very High	nigu	Medium	Low	None $\sum C_{ij} w_j$	41	0.14	5.857143 63.28571
Js C		ity				$\sum C_{ij} W_j$		1	03.265/1
	Energy Capacity	None	Non conventional	Conventional electricit	Electricity mid volto	Electricity bish welt-	04	0.35	20.25
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	81	0.25	
	Alternative services	ALC: A		Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	81	0.25	20.25
C ₆₂	Alternative source	None	None		High	Voru High			17.5
C ₆₂ C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	70	0.25	
C ₆₂ C ₆₃	Dependence for service Outage rate				High Low	Very low	70 81	0.25	20.25
C ₆₂ C ₆₃ C ₆₄ f ₆	Dependence for service Outage rate Score Energy Capacity	Very low Very High	Low	Medium					
C ₆₂ C ₆₃ C ₆₄ f ₆ 7	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	Very low Very High	Low High	Medium Medium	Low	Very low $\sum C_{ij} w_j$	81	0.25 1	20.25 78.25
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁	Dependence for service Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality	Very low Very High Very low	Low High Low	Medium Medium Medium	Low High	Very low $\sum C_{ij} w_j$ Very high	81	0.25	20.25 78.25 8.2
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very low Very High Very low Very low	Low High Low Low	Medium Medium Medium Medium	Low High High	Very low $\sum C_{ij} w_j$ Very high Very high	81 41 45	0.25 1 0.2 0.2 0.2	20.25 78.25 8.2 9
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	Very low Very High Very low Very low Very low	Low High Low Low Low	Medium Medium Medium Medium Medium	Low High High High	Very low $\sum C_{ij} w_j$ Very high Very high Very high	81 41 45 45	0.25 1 0.2 0.2 0.2	20.25 78.25 8.2 9 9
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very Iow Very High Very Iow Very Iow Very Iow Very Negati	Low High Low Low Low Negative	Medium Medium Medium Medium Medium Stable	Low High High High Positive	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive	81 41 45 45 41	0.25 1 0.2 0.2 0.2 0.2 0.2	20.25 78.25 8.2 9 9 9
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very low Very High Very low Very low Very low	Low High Low Low Low	Medium Medium Medium Medium Medium	Low High High High	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High	81 41 45 45	0.25 1 0.2 0.2 0.2	20.25 78.25 8.2 9 9 8.2 12
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very Iow Very High Very Iow Very Iow Very Iow Very Negati	Low High Low Low Low Negative	Medium Medium Medium Medium Medium Stable	Low High High High Positive	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive	81 41 45 45 41	0.25 1 0.2 0.2 0.2 0.2 0.2	20.25 78.25 8.2 9 9 9
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₁ C ₇₃ C ₇₄ C ₇₄ f ₇ 8	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very low Very High Very low Very low Very low Very low Very low	Low High Low Low Low Negative Low	Medium Medium Medium Medium Stable Medium	Low High High Positive High	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very high Very High $\sum C_{ij} w_j$	81 41 45 45 41 60	0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 1	20.25 78.25 8.2 9 9 8.2 12 46.4
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 C ₇₄ C ₇₄ 7 C ₇₄ 7 C ₇₄	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low Very High Very low Very low Very low Very low Very low Very low	Low High Low Low Low Low Low Low Low	Medium Medium Medium Medium Stable Medium Intermediate	Low High High Positive High High	Very low $\sum C_{ij} w_j$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	81 41 45 45 41 60 61	0.25 1 0.2 0.2 0.2 0.2 0.2 1 0.2	20.25 78.25 8.2 9 9 8.2 12 46.4 12.2
C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} f_7 f_7 C_{81} C_{82}	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very High Very low Very low Very low Very low Very low Very low Very low	Low High Low Low Low Low Low Low Low Low	Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Low High High High Positive High High High	Very low $\sum C_{ij} w_j$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very high	81 41 45 45 41 60 61 70	0.25 1 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2	20.25 78.25 9 9 8.2 12 46.4 12.2 12.2
C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 C ₇₄ C ₇₄ 7 C ₇₄ 7 C ₇₄	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very High Very low Very low Very Negati Very low Very low Very low Very low Very low	Low High Low Low Low Low Low Low Low Low Low Low	Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Low High High Positive High High	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	81 41 45 45 41 60 60 61 70 60	0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	20.25 78.25 9 9 8.2 12 46.4 12.2 14 12.2
C ₆₂ C ₆₃ C ₆₄ f C ₇₁ C ₇₁ C ₇₂ C ₇₃ C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ C ₇₄ f C ₇₄ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₄ C ₈₄ C ₈₄	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmentol Copocity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	Very Iow Very High Very Iow Very Iow Very Negati Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Low Low Low Low Low Low Low Low Low	Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Low High High Positive High High High High	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very high Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high	81 41 45 45 41 60 60 61 70 60 81	0.25 1 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2 0.2	20.25 78.25 9 9 8.2 12 46.4 12 12.2 14 12 16.2
C ₆₂ C ₆₃ C ₆₄ f C ₇₁ C ₇₁ C ₇₂ C ₇₃ C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ f C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₇₈ C ₇₈ C ₇₄ C ₇₈ C ₈₈ C ₈₈ C ₈₄	Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very High Very low Very low Very Negati Very low Very low Very low Very low Very low	Low High Low Low Low Low Low Low Low Low Low Low	Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Low High High High High High High High High	Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	81 41 45 45 41 60 60 61 70 60	0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	20.25 78.25 9 9 8.2 12 46.4 12.2 14 12.2

Appendix IV. C.1: Yadagirigutta Mandal – Yadagirigutta

Appendix IV.D.1: Voligonda Mandal – Voligonda

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	37	1	37
fı	Score Service Capacity					$\sum C_{ij} w_{j}$		1	37
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C23	Administrative agencies	None	State	District	Mandal	Habitational	60	0.1667	10
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₅	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C26	Presence of NGOs	None	Low	Medium	High	Very High	65	0.1667	10.83333
f_2	Score Institutional Capacity					$\sum C_{ij} w_{j}$		1	60
3	Human Resources Capacity (service pr	ovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2	13
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	65	0.2	13
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			81	0.2	16.2
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				81	0.2	16.2
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	74.6
4	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	61	0.2	12.2
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C_{42}	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	50	0.2	10
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	60	0.2	12
C45	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	65	0.2	13
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	60.2
5	Economical and Financial Capacity								
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
C52	Market incentives	None	Low	Medium	High	Very high	70	0.14	10
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	50	0.14	7.142857
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	55	0.14	7.857143
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	65	0.14	9.285714
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	61	0.14	
C57			High	Medium	Low	None	70	0.14	
fs	Score Economical and Financial Capac	ty				$\sum C_{ij} w_j$		1	64.57143
	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	65	0.25	16.25
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	61	0.25	15.25
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	61	0.25	15.25
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	45	0.25	11.25
f6	Score Energy Capacity					$\sum C_{ij} w_j$		1	58
	Environmental and Ecological Capacity								_
C ₇₁	Environment quality	Very low	Low	Medium	High	Very high	41	0.2	8.2
C72	Size of resource system	Very low	Low	Medium	High	Very high	55	0.2	11
~	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	50	0.2	10
C ₇₃		Very Negati	Negative	Stable	Positive	Very Positive	45	0.2	9
C ₇₄	Growth or replacement rate			Medium	High	Very High	55	0.2	11
	Resource sensibility	Very low	Low						49.2
C ₇₄	Resource sensibility Score Environmental Capacity	Very low	LOW			$\sum C_{ij} w_j$		1	
C ₇₄	Resource sensibility	Very low	Low			$\sum C_{ij} w_j$		1	
C ₇₄	Resource sensibility Score Environmental Capacity	Very low Very low	Low	Intermediate	High	∑C _{ij} wj Very high	65	1	13
C ₇₄ C ₇₄ f ₇ 8	Resource sensibility Score Environmental Capacity Social and Cultural Capacity				High High		65 65	0.2	13 13
C ₇₄ C ₇₄ f 7 8 C ₈₁	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low	Low	Intermediate		Very high			13 13 13
C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low	Low	Intermedia te Intermedia te	High	Very high Very high	65	0.2	13 13 13 13
C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₁ C ₈₂ C ₈₃	Resource sensibility <u>Score Environmental Capacity</u> <u>Social and Cultural Capacity</u> Communal ownership Political stability Equity	Very low Very low Very low	Low Low Low	Intermedia te Intermedia te Intermedia te	High High	Very high Very high Very high	65 65	0.2 0.2	13 13 13

Appendix IV.D.2: Voligonda Mandal – Sunkishala

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	30	1	30
e,	Score Service Capacity					$\sum C_{ij} w_i$		1	30
2	Institutional Capacity					2-3-5			
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	55	0.1667	9.166667
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₅	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	45	0.1667	7.5
f ₂	Score Institutional Capacity					$\sum C_{ij} w_j$		1	56.83333
3	Human Resources Capacity (service pr	rovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	60	0.2	12
	1			Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
	1					Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
C32		Home	lincentarie	Laboratory technician	Laboratory technician	Laboratory technician	00	0.2	
_									
	l			Water systems operator	Water systems operator	Water systems operator	I		
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader	l		
	l					IT technician	I		
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			80	0.2	16
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				80	0.2	16
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
F2	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	72.2
4	Technical Capacity					2-17-17			
	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	13
C41	operations	water ose	r unipring water			Control Water Quality	05	0.2	15
	1			Control Water Quality	Control Water Quality				
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	55	0.2	11
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	55	0.2	11
C45	Maintenance network	None	State	District	Mandal	Habitational	70	0.2	14
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	81	0.2	16.2
	1		•		District Approved	District Approved			
e.,	Score Technical Capacity					$\sum C_{ij} w_i$		1	65.2
5						201111		-	00.2
-	Private sector investment	None	State	Degional	District	Mandal	75	0.14	10.71429
C ₅₁		None		Regional					
C ₅₂	Market incentives	None	Low	Medium	High	Very high	40	0.14	5.714286
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	30	0.14	4.285714
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	7.142857
	l			Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	50	0.14	7.142857
C57	Loss to corruption	Very High	High	Medium	Low	None	60	0.14	8.571429
f ₅	Score Economical and Financial Capac					$\sum C_{ij} w_j$		1	50.71429
6	Energy Capacity								
	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	70	0.25	17.5
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	45	0.25	11.25
	Dependence for service	Very low	Low	Medium	High	Very High	55	0.25	13.75
		• CI Y 10 W	High	Medium	Low	Very low	41	0.25	10.25
C ₆₃		Vory Link		Medium			41	0.25	
C ₆₃	Outage rate	Very High	U U						52.75
C ₆₃ C ₆₄ F ₆	Outage rate Score Energy Capacity					$\sum C_{ij} w_j$		1	
C ₆₃ C ₆₄ F ₆ 7	Outage rate Score Energy Capacity Environmental and Ecological Capacity	(
C ₆₃ C ₆₄ f₆ 7 C ₇₁	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very low	Low	Medium	High	Very high	65	0.2	13
C ₆₃ C ₆₄ f₆ 7 C ₇₁ C ₇₂	Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality Size of resource system	Very low Very low	Low	Medium	High	Very high Very high	65	0.2	13
C ₆₃ C ₆₄ f₆ 7 C ₇₁	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very low	Low			Very high		0.2	
C ₆₃ C ₆₄ f₆ C ₇₁ C ₇₂ C ₇₃	Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality Size of resource system	Very low Very low	Low	Medium	High	Very high Very high	65	0.2	13
C ₆₃ C ₆₄ f₆ C ₇₁ C ₇₂ C ₇₃ C ₇₄	Outage rate <u>Score Energy Capacity</u> <u>Environmental and Ecological Capacity</u> Environment quality Size of resource system Predictability of resource dynamics	Very low Very low Very low	Low Low Low	Medium Medium	High High	Very high Very high Very high	65 60	0.2 0.2 0.2	13 12
C ₆₃ C ₆₄ f₆ C ₇₁ C ₇₂ C ₇₃ C ₇₄	Outage rate <u>Score Energy Capacity</u> <u>Environmental and Ecological Capacity</u> Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very Iow Very Iow Very Iow Very Negati	Low Low Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive Very High	65 60 55	0.2 0.2 0.2 0.2	13 12 11
C ₆₃ C ₆₄ f ₆ C ₇₁ C ₇₂ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very Iow Very Iow Very Iow Very Negati	Low Low Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive	65 60 55	0.2 0.2 0.2 0.2	13 12 11 12
C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 8	Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility <u>Score Environmental Capacity</u> Social and Cultural Capacity	Very low Very low Very low Very Negati Very low	Low Low Low Negative Low	Medium Medium Stable Medium	High High Positive High	Very high Very high Very high Very Positive Very High ΣC _{ij} w _j	65 60 55 60	0.2 0.2 0.2 0.2 0.2 1	13 12 11 12 61
C63 C64 C71 C72 C73 C74 C74 C74 C74 C74 C74 C74 C74 C74 C74	Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very Iow Very Iow Very Iow Very Negati Very Iow Very Iow	Low Low Low Low Low Low	Medium Medium Stable Medium Intermediate	High High Positive High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	65 60 55 60 65	0.2 0.2 0.2 0.2 0.2 1 0.2	13 12 11 12 61 13
C63 C64 7 C71 C72 C73 C74 C74 C74 C74 C74 C74 C81 C82	Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very Iow Very Iow Very Iow Very Negati Very Iow Very Iow Very Iow	Low Low Low Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High High	Very high Very high Very positive Very High $\sum C_{ij} w_j$ Very high Very high	65 60 55 60 60 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2	13 12 11 12 61 13 13
C63 C64 7 C71 C72 C73 C74 C74 C74 C74 C74 C81 C81 C82 C83	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low Low	Medium Medium Stable Medium Intermedia te Intermedia te Intermedia te	High High Positive High High High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	65 60 55 60 60 65 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2 0.2	13 12 11 12 61 13 13 13 13
C63 C64 7 C71 C72 C73 C74 C74 C74 C74 C74 C74 C81 C82	Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very Iow Very Iow Very Iow Very Negati Very Iow Very Iow Very Iow	Low Low Low Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High High	Very high Very high Very positive Very High $\sum C_{ij} w_j$ Very high Very high	65 60 55 60 60 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2	13 12 11 12 61 13 13 13 13 12
C63 C64 C71 C72 C73 C74 C74 C74 C74 C74 C74 C74 C74	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low Low	Medium Medium Stable Medium Intermedia te Intermedia te Intermedia te	High High Positive High High High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	65 60 55 60 60 65 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2 0.2	13 12 11 12 61 13 13 13 13

Appendix IV.E.1: Mothkur Mandal – Mothkur

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	45	1	45
ϵ_I	Score Service Capacity					$\sum C_{ij} w_{j}$		1	45
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	55	0.1667	9.166667
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C ₂₅	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	65	0.1667	10.83333
f ₂	Score Institutional Capacity					$\sum C_{ij} w_j$		1	65.16667
3	Human Resources Capacity (service p	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2	13
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	55	0.2	11
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			95	0.2	19
			Mechanic assistant	Water meter reader					
				Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker				85	0.2	17
C35	Access to Higher Education	None	State	Regional	District	Mandal	65	0.2	13
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	73
4	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	13
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	55	0.2	11
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	60	0.2	12
C45	Maintenance network	None	State	District	Mandal	Habitational	81	0.2	16.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	60	0.2	12
					District Approved	District Approved			
F4	Score Technical Capacity					$\sum C_{ij} w_j$		1	64.2
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	65	0.14	9.285714
C52	Marketincentives	None	Low	Medium	High	Very high	45	0.14	6.428571
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	65	0.14	9.285714
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	60	0.14	8.571429
						None		0.14	9.285714
	Loss to corruption	Very High	High	Medium	Low		65		
C ₅₇	Score Economical and Financial Capac		High	Medium	Low	$\sum C_{ij} w_j$	65	1	55.71429
C ₅₇	Score Economical and Financial Capac Energy Capacity			Medium	Low				
C ₅₇	Score Economical and Financial Capac Energy Capacity Primary source	ity None	Non-conventional	Conventional electricity	Electricity mid-voltage	$\sum_{ij} C_{ij} w_j$ Electricity high voltage	70	0.25	17.5
C ₅₇	Score Economical and Financial Capac Energy Capacity Primary source Alternative source	ity None None				∑C _{ij} w _j Electricity high voltage Generator > 50 HP	70	0.25	17.5 15.25
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃	Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	ity None None Very Iow	Non-conventional None Low	Conventional electricity Generator < 10 HP Medium	Electricity mid-voltage Generator < 50 HP High	∑C _{ij} w _j Electricity high voltage Generator > 50 HP Very High	70 61 61	0.25 0.25 0.25	17.5 15.25 15.25
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃	Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	ity None None	Non-conventional None	Conventional electricity Generator < 10 HP	Electricity mid-voltage Generator < 50 HP	ΣC _{ij} w j Electricity high voltage Generator > 50 HP Very High Very low	70	0.25 0.25 0.25 0.25	17.5 15.25 15.25 12.5
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	ity None None Very Iow Very High	Non-conventional None Low	Conventional electricity Generator < 10 HP Medium	Electricity mid-voltage Generator < 50 HP High	∑C _{ij} w _j Electricity high voltage Generator > 50 HP Very High	70 61 61	0.25 0.25 0.25	17.5 15.25 15.25
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	ity None None Very Iow Very High	Non-conventional None Low	Conventional electricity Generator < 10 HP Medium	Electricity mid-voltage Generator < 50 HP High	ΣC _{ij} w j Electricity high voltage Generator > 50 HP Very High Very low	70 61 61	0.25 0.25 0.25 0.25	17.5 15.25 15.25 12.5
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	ity None None Very low Very High Very low	Non-conventional None Low	Conventional electricity Generator < 10 HP Medium Medium Medium	Electricity mid-voltage Generator < 50 HP High Low High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high	70 61 50 55	0.25 0.25 0.25 0.25 1 0.25	17.5 15.25 15.25 12.5 60.5
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	ity None None Very Iow Very High Very Iow Very Iow	Non-conventional None Low High	Conventional electricity Generator < 10 HP Medium Medium	Electricity mid-voltage Generator < 50 HP High Low High High	$\frac{\sum C_{ij} w_j}{\text{Electricity high voltage}}$ Electricity high voltage Generator > 50 HP Very High Very Iow $\frac{\sum C_{ij} w_j}{\sum c_{ij} w_j}$	70 61 50 55 41	0.25 0.25 0.25 0.25 1 0.25 1 0.2 0.2	17.5 15.25 15.25 12.5 60.5 11 8.2
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	ity None None Very Iow Very High Very Iow Very Iow Very Iow	Non-conventional None Low High Low Low Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Electricity mid-voltage Generator < 50 HP High Low High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high	70 61 50 55 41 41	0.25 0.25 0.25 1 0.2 1 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 11 8.2 8.2
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	ity None None Very Iow Very High Very Iow Very Iow	Non-conventional None Low High Low Low	Conventional electricity Conventional of HP Medium Medium Medium Medium	Electricity mid-voltage Generator < 50 HP High Low High High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high Very high Very Positive	70 61 50 55 41	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 11 8.2 8.2 8.2 9
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	ity None None Very Iow Very High Very Iow Very Iow Very Iow	Non-conventional None Low High Low Low Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Electricity mid-voltage Generator < 50 HP High Low High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high	70 61 50 55 41 41	0.25 0.25 0.25 1 0.2 1 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 11 8.2 8.2
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	ity None None Very low Very low Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Electricity mid-voltage Generator < 50 HP High Low High High High High Positive	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high Very high Very Positive	70 61 50 55 41 41 45	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 11 8.2 8.2 8.2 9
C37 G G G G C61 C61 G G C62 C63 G G G C63 C64 G <thg< th=""> <thg< thd=""> <thg< th=""> <</thg<></thg<></thg<>	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	ity None None Very low Very low Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Electricity mid-voltage Generator < 50 HP High Low High High High High Positive	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	70 61 50 55 41 41 45	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 111 8.2 8.2 8.2 9 8
C37 G G G G C61 C61 G G C62 C63 G G G C63 C64 G <thg< th=""> <thg< thd=""> <thg< th=""> <</thg<></thg<></thg<>	Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity	ity None None Very low Very low Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Electricity mid-voltage Generator < 50 HP High Low High High High High Positive	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	70 61 50 55 41 41 45	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.5 111 8.2 8.2 8.2 9 8
C ₃₇ 6 C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ 7 8	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	ity None None Very low Very High Very low Very low Very low Very low	Non-conventional None Low High Low Low Low Low Negative Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium	Electricity mid-voltage Generator < 50 HP High Low High High High High High Positive High	$\frac{\sum C_{ij} w_j}{}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{}$ Very high Very high Very high Very High Very High $\frac{\sum C_{ij} w_j}{}$	70 61 61 50 55 41 41 45 40	0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 60.5 111 8.2 8.2 8.2 9 8 8 44.4
C ₅₇ C ₅₇ C ₅₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₇₂ C ₇₃ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Scotal and Cultural Capacity Communal ownership	ity None None Very low Very High Very Iow Very low Very low Very low Very low	Non-conventional None Low High Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High	$\frac{\sum C_{ij} w_j}{}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{}$ Very high Very high Very Positive Very High $\frac{\sum C_{ij} w_j}{}$ Very high Very high	70 61 61 50 55 41 41 45 40	0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	17.5 15.25 15.25 60.5 111 8.2 8.2 9 8 44.4 11
C ₅₇ C ₅₇ C ₆₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₆₄ C ₆₄ C ₇₁ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₈₁ C ₈₂ C ₈₃	Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cutural Capacity Communal ownership Political stability	ity None Very low Very low Very High Very low Very low Very low Very low Very low Very low Very low	Non-conventional None Low High Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high	70 61 61 50 55 41 41 45 40 	0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 60.5 60.5 60.5 60.5 60.5 60.5 8 8 2 8 8 44.4 111 113
C ₅₇ C ₅₇ C ₅₁ C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ C ₆₄ C ₇₂ C ₇₃ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C ₇₅ C ₇₅ C ₇₄ C ₇₅ C	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Scola and Cultural Capacity Communal ownership Political stability	ity None Very low Very low Very low Very low Very low Very low Very low Very low Very low	Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Intermediate Intermediate	Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very High Very High $\sum C_{ij} w_j$ Very High Very High Very High Very high Very high	70 61 50 55 41 41 41 45 40 20 55 65 65 65	0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	17.5 15.25 15.25 12.5 60.9 111 8.2 8.2 8.2 8.2 8.2 8.2 8.2 9 8 8 44.4 111 113 12

Appendix IV.E.2: Mothkur Mandal – Anajipuram

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
211	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	40	1	40
1	Score Service Capacity					$\sum C_{ij} w_j$		1	40
2	Institutional Capacity								
221	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
223	Administrative agencies	None	State	District	Mandal	Habitational	61	0.1667	10.16667
23	Administrative processes	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
25	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
25	Presence of NGOs	None	Low	Medium	High	Very High	30	0.1667	10.10007
-26	Score Institutional Capacity	NOTE	LOW	Weurum	i i gii	$\sum C_{ij} w_i$	30	0.1007	49.5
2 3		(outidou)				Zeijwj		1	49.3
	Human Resources Capacity (service pr Professionals	None	None	Administrativo suporvisor	Administrative manager	Administrative manager	41	0.2	8.2
31	Professionals	None	None	Administrative supervisor Health Scientist	Administrative manager Health Scientist	Administrative manager Health Scientist	41	0.2	0.2
_			1	nearui scienust	Engineer				
_			1		Engineer	Engineer			
_			1			Lawyer			
7	Chilled Leben	Neze				Public relations manager		0.2	8.2
232	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	41	0.2	0.2
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
233	Unskilled Labor	Craftsman	Clerk	Clerk			60	0.2	12
			Mechanic assistant	Water meter reader					
				Water systems worker					
34	Illiterate	Caretaker	Caretaker				60	0.2	12
35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	52.6
4	Technical Capacity		L						
241	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
242	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
			1			Maintain IT systems			
243	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
245	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
245	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
					District Approved	District Approved			
4	Score Technical Capacity					$\sum C_{ij} w_i$		1	49.2
5									
251	Private sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
252	Marketincentives	None	Low	Medium	High	Very high	50	0.14	7.142857
253	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
-53	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	40		
-54	Asset values	None						0.14	7.857143
			Real Estate	Real estate		Real estate	40 55 55	0.14	7.857143 7.857143
		None	Real Estate		Real estate Equipment		55		
		None	Real Estate	Real estate Equipment	Real estate	Real estate Equipment	55		
34	Investment activities			Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks	55	0.14	7.857143
-	Investment activities Loss to corruption	None	Low	Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High	55 55 61	0.14	7.857143 8.714286
-	Loss to corruption	None Very High	Low	Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks Very High None	55 55	0.14	7.857143 8.714286 6.428571
257 5	Loss to corruption Score Economical and Financial Capac	None Very High	Low	Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High	55 55 61	0.14	7.857143 8.714286
57 5 6	Loss to corruption Score Economical and Financial Capac Energy Capacity	None Very High <i>ity</i>	Low High	Equipment Medium Medium	Real estate Equipment Cash High Low	Real estate Equipment Cash - Stocks Very High None ΣC _{ij} w _j	55 55 61 45	0.14 0.14 0.14 1	7.857143 8.714286 6.428571 52.42857
-57 5 6	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source	None Very High ity None	Low High Non-conventional	Equipment Medium Medium Conventional electricity	Real estate Equipment Cash High Low Electricity mid-voltage	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage	55 55 61 45 55	0.14 0.14 0.14 1 0.25	7.857143 8.714286 6.428571 52.42857 13.75
-57 5 -61 -62	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source	None Very High ity None None	Low High Non-conventional None	Equipment Medium Medium Conventional electricity Generator < 10 HP	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	55 55 61 45 55 45	0.14 0.14 1 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25
-57 5 -61 -62 -63	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service	None Very High <i>ity</i> None None Very Iow	Low High Non-conventional None Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	55 55 61 45 55 45 40	0.14 0.14 1 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10
-57 5 -61 -62 -63	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service Outage rate	None Very High ity None None	Low High Non-conventional None	Equipment Medium Medium Conventional electricity Generator < 10 HP	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	55 55 61 45 55 45	0.14 0.14 1 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25
-57 -61 -62 -63 -64 -64	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	55 55 61 45 55 45 40	0.14 0.14 1 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25
6 6 7 -61 7 -61 7 -62 7 -63 7 -64 7 -64 7 -64 7 -64 7 -64 7 -64 7 -64	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None Very High ity None None Very Iow Very High	Low High Non-conventional None Low High	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High $\sum C_{ij} w_j$	55 55 61 45 55 45 40 45	0.14 0.14 1 0.25 0.25 0.25 0.25 1	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25 46.25
-57 -57 -61 -62 -63 -64 -64 -64 -64 -71	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None Very High ity None None Very Iow Very High Very Iow	Low High Non-conventional None Low High Low Low Low High Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high	55 55 61 45 55 45 40 40 45 0 60	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 100 11.25 46.25
-57 5 -61 -62 -63 -64 -64 -7 -71 -72	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None Very High Ity None None Very Iow Very High Very High Very High	Low High Non-conventional None Low High Low Low Low	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	55 55 61 45 55 45 40 45 60 55	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 1 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25 46.25 46.25 12 12
6 7 7 6 7 6 7 6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high	55 55 61 45 55 45 40 45 40 45 0 60 55 50	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 11.25 11.25 10 11.25 46.25 2 2 2 12 11 11
6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Low Negative	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very high	555 555 61 45 555 45 40 45 55 60 55 50 55	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2	7.857143 8.714286 6.428571 52.42857 11.25 11.25 10 11.25 46.25 2 11 11 10 10 11
6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high Very High Very High	55 55 61 45 55 45 40 45 40 45 0 60 55 50	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25 46.25 46.25 12 11 11 12 11 11 11
6 6 7 7 6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Low Negative	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very high	555 555 61 45 555 45 40 45 55 60 55 50 55	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2	7.857143 8.714286 6.42857 52.42857 13.75 11.25 10 11.25 46.25 10 11.25 10 11.25 10 11.25 10 11.25 10 11.25 10 11 11 10 11 11
6 6 7 7 6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None Very High None Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Low Low Low Low	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\Sigma C_{ij} w_j$ Very high Very high Very high Very High Very High Very High $\Sigma C_{ij} w_j$	555 55 45 45 40 45 60 55 50 55 55	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	7.857143 8.714286 6.428571 52.42857 13.75 11.25 11.25 46.25 12 11 11 125 46.25 12 12 11 11 10 11 11 11 55
-57 5 -61 -62 -63 -64 -64 -71 -72 -73 -74 -74 -74 -74 -74 -74 -74 -74	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Low Negative	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high Very High Very High	555 55 61 45 45 40 45 55 50 55 55 55	0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25 46.25 10 11 12 11 12 11 10 10 11 11 55 55 10 10 11 11 11 11 11 11 11 11 11 11 11
57 5 6 -61 -62 -63 -64 -64 -71 -72 -73 -74 -74 -81	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None Very High None Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Low Low Low Low	Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\Sigma C_{ij} w_j$ Very high Very high Very high Very High Very High Very High $\Sigma C_{ij} w_j$	555 55 45 45 40 45 60 55 50 55 55	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	7.857143 8.714286 6.428571 52.42857 13.75 11.25 102 11.25 46.25 102 111 112 111 112 111 111 111 111 111
57 5 6 5 6 7 6 7 6 7 6 7 7 7 7 7 7 7 8 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Social and Cultural Capacity Communal ownership	None Very High ity None Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low Low Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High Positive High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very High Very high Very high	555 55 61 45 45 40 45 55 50 55 55 55	0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 10 11.25 46.25 10 11 12 11 12 11 10 10 11 11 55 55 10 10 11 11 11 11 11 11 11 11 11 11 11
6 6 7 7 7 7 7 7 7 7	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capadity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Political stability	None Very High ity None Very low Very How Very How Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Stable Medium Stable Medium Intermediate Intermediate	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	555 55 45 40 45 55 50 55 55 55 55 55 60	0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	7.857143 8.714286 6.428571 52.42857 13.75 11.25 102 11.25 46.25 102 111 112 111 112 111 111 111 111 111
6 7 7 7 7 8 8 8 8 8 8 8 8 8 8	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	None Very High ity None Very low Very low Very High Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Negative Low Low Low Low Low Low	Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	555 55 45 45 40 45 55 50 55 50 55 55 55 60 65	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	7.857143 8.714288 6.428571 52.42857 13.75 11.22 10 11.22 46.25 46.25 12 11 11 11 55 55 11.22 10 11 11 11 11 55 55 11 12 11 11 11 11 11 11 11 11 11 11 11

Appendix IV.E.3: Mothkur Mandal – Bujilapuram

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	38	1	38
f ₁	Score Service Capacity					$\sum C_{ij} w_{j}$		1	38
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C25	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	25	0.1667	4.166667
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	46.83333
3	Human Resources Capacity (service pr	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	40	0.2	8
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	45	0.2	9
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
_					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			60	0.2	12
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				60	0.2	12
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
f ₃	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	53.2
4	Technical Capacity								
C_{41}	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C45	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
					District Approved	District Approved			
f ₄	Score Technical Capacity					$\sum C_{ij} w_j$		1	49.2
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
C52	Market incentives	None	Low	Medium	High	Very high	45	0.14	6.428571
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
C54	Budget	None	Basic accounting	Annual	The sheet by a second by	The sheet are standed	40		
C55	Asset values	None			Tracked bi-annually	Tracked quarterly	40	0.14	5.714286
~35		None	Real Estate	Real estate	Real estate	Real estate		0.14	
~>5		None	Real Estate				40		5.714286
		None	Real Estate	Real estate	Real estate	Real estate	40		5.714286
	Investment activities	None	Real Estate	Real estate	Real estate Equipment	Real estate Equipment	40		5.714286 6.428571 6.428571
C56	Loss to corruption	None Very High	Low	Real estate Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks	40 45	0.14	5.714286 6.428571 6.428571 7.142857
C56		None Very High	Low	Real estate Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High	40 45 45	0.14	5.714286 6.428571 6.428571
C56 C57 F5	Loss to corruption	None Very High	Low	Real estate Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High None	40 45 45	0.14	5.714286 6.428571 6.428571 7.142857
C56 C57 F5 6	Loss to corruption Score Economical and Financial Capac	None Very High	Low	Real estate Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High None	40 45 45	0.14	5.714286 6.428571 6.428571 7.142857
C56 C57 F5 6	Loss to corruption Score Economical and Financial Capac Energy Capacity	None Very High ity None None	Low High	Real estate Equipment Medium Medium	Real estate Equipment Cash High Low	Real estate Equipment Cash - Stocks Very High None ΣC _{ij} w _j	40 45 45 50	0.14 0.14 0.14 1	5.714286 6.428571 7.142857 46.57143
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source	None Very High ity None	Low High Non-conventional	Real estate Equipment Medium Medium Conventional electricity	Real estate Equipment Cash High Low Electricity mid-voltage	Real estate Equipment Cash - Stocks Very High None <u>\$C g w j</u> Electricity high voltage	40 45 45 50 60	0.14 0.14 0.14 1 0.25	5.714286 6.428571 7.142857 46.57143
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source	None Very High ity None None	Low High Non-conventional None	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	40 45 45 50 60 45	0.14 0.14 1 0.25 0.25	5.714286 6.428571 7.142857 46.57143
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	40 45 50 60 45 45	0.14 0.14 1 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service Outage rate	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow	40 45 50 60 45 45	0.14 0.14 1 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143 15 11.25 11.25 11.25
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow	40 45 50 60 45 45	0.14 0.14 1 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143 15 11.25 11.25 11.25
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ F ₆ 7	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None Very High ity None None Very Iow Very High	Low High Non-conventional None Low High	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High $\sum C_{ij} w_j$	40 45 50 60 45 45 45 45 60 60 60	0.14 0.14 1 0.25 0.25 0.25 0.25 1	5.714286 6.428571 7.142857 46.57143 15 11.25 11.25 11.25 11.25 48.75 48.75 21 21 21 21
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₃ C ₆₄ 7 C ₇₁	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None Very High None None Very low Very High Very low Very low Very low	Low High Non-conventional None Low High Low Low Low High Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high	40 45 50 60 45 45 45 45 60 60	0.14 0.14 0.14 0.25 0.25 0.25 0.25 1 0.25	5.714286 6.428571 7.142857 46.57143 11.25 11.25 11.25 11.25 11.25 11.25 11.25
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₃ C ₆₃ C ₆₄ f ₆ C ₆₄ f ₆ C ₇₁ C ₇₂	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None Very High Ity None None Very Iow Very High Very High Very High	Low High Mon-conventional None Low High Low Low Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	40 45 50 60 45 45 45 45 60 60 60	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 1 0.25 0.25	5.714286 6.428571 7.142857 46.57143 11.25 12.25
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73}	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	None Very High None None Very low Very High Very low Very low Very low	Low High Non-conventional None Low High Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very how $\sum C_{ij} w_j$ Very high Very high Very high	40 45 50 60 45 45 45 45 60 60 60 60	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143 15 11.25 11.25 11.25 48.75 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Negative	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very high	40 45 50 60 45 45 45 45 60 60 60 60 60 60 50	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2	5.714286 6.428571 7.142857 46.57143 11.25 12.25 11.25 12.25
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Negative	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	40 45 50 60 45 45 45 45 60 60 60 60 60 60 50	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2	5.714286 6.428571 7.142857 46.57143 11.25 11.25 11.25 11.25 48.75 48.75 12 12 12 12 12
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity	None Very High Ity None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Low High Non-conventional None Low High Low Low Low Negative	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low Low High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	40 45 50 60 45 45 45 45 60 60 60 60 60 60 50	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2	5.714286 6.428571 7.142857 46.57143 11.25 11.25 11.25 11.25 48.75 48.75 12 12 12 12 12
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	None Very High iy None Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low	Real estate Equipment Medium Conventional electricity Generator 4 10 HP Medium Medium Medium Medium Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high Very high Very high	40 45 50 60 45 45 45 45 60 60 60 60 60 60 55	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	5.714286 6.428571 7.142857 46.57143 11.25 12.25 11.25 12.25 11.25 12.25
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 C ₇₄ 7 C ₇₄ 8 C ₈₁ C ₈₂	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Score and Cultural Capacity Communal ownership Political stability	None Very High ity None Very low Very High Very High Very How Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Negative Low Low Low Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	40 45 50 45 45 45 45 45 45 60 60 60 60 50 55 5 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143 1.55 11.25 11.25 48.75 122 12 12 12 12 12 12 12 12 12 12 12 12
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₇₄ C ₈₁ C ₈₂ C ₈₃	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	None Very High Ity None Very low Very low Very High Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Negative Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Stable Medium Stable Intermediate Intermediate Intermediate	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	40 45 45 60 45 45 45 45 45 60 60 60 60 60 55 5 9 60 60 65 65	0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	5.714286 6.428571 7.142857 46.57143 5 11.25 12.25 11.25 12.25 11.25 12.2
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 C ₇₄ 7 C ₇₄ 8 C ₈₁ C ₈₂	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Score and Cultural Capacity Communal ownership Political stability	None Very High ity None Very low Very High Very High Very How Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Negative Low Low Low Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium Intermediate	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	40 45 50 45 45 45 45 45 45 60 60 60 60 50 55 5 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	5.714286 6.428571 7.142857 46.57143 5 11.25 12.2

Appendix IV.E.4: Mothkur Mandal – Dharmapur

1 Serv 1 Effect 2 Score 3 Adm 4 Adm 5 Gove 6 Press 7 Press 8 Adm 9 Adm 10 Prof 11 Prof 12 Skill 14 Prof 15 Score 16 Prof 17 Skill 18 Adm 19 Adm 10 Prof 11 Oper 12 Adm 13 Unsit 14 Privit 15 Score 16 Econe 18 Main 19 Score 10 Privit 10 Score 11 Privit 10 Score 10 Privit 10 <th>pacity Factors</th> <th></th> <th></th> <th>Partitio</th> <th>ned Scoring</th> <th></th> <th></th> <th></th> <th></th>	pacity Factors			Partitio	ned Scoring				
I Effect 2 Institution 2 2 Institution 3 Adm Adm 4 Adm Scorr 5 Gove Scorr 6 Press Scorr 6 Press Scorr 7 Scorr Scorr 8 Gove Scorr 9 Scorr Scorr 1 Prof Scorr 2 Skill Scorr 3 Unsi Scorr 4 Illitte Scorr 5 Scorr Scorr 6 Econ Scorr 7 Jose Scorr 8 Scorr Scorr 9 Scorr Scorr 10 Print Scorr 11 Print Scorr 12 Alter Scorr 13 Adat Scorr 14 Scorr Scor <th></th> <th>1-20</th> <th>21-40</th> <th>41-60</th> <th>61-80</th> <th>81-100</th> <th>Score</th> <th>Weight</th> <th>CF score</th>		1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
Score Score 1 Body Institution 1 Body Institution 3 Adm Institution 4 Adm Institution 5 Gores Institution 6 Press Institution 7 Adm Institution 8 Gores Institution 9 Institution Institution 1 Prof Institution 1 Prof Institution 2 Skill Institution 3 Institution Institution 4 Institution Institution 5 Institution Institution 6 Inner Inner 1 Inner Inner 2 Inner	rvice Capacity								
2 Institution 1 Body 2 Open 3 Adm 4 Adm 5 Gove 6 Presson 7 Presson 8 Adm 9 Skill 1 Prof 1 Prof 2 Skill 3 Hum 4 Prof 5 Skill 6 Scorr 7 Cove 8 Materia 9 Scorr 9 Scorr 9 Nataria 9 Nataria 9 Scorr 9 Perint	ective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	35	1	35
i Body i Body i Body i Adm s Gove i Prof i Prof i Prof i Gove i Prof i Gove i Gove i Gove i	ore Service Capacity					$\sum C_{ij} w_j$		1	35
2 Opel 3 Adm 4 Adm 5 Gove 5 Gove 6 Pres 5 Gove 2 Skill 2 Skill 2 Skill 2 Skill 3 Unsi 4 Illittic 5 Adm 4 Illittic 5 Adm 6 Fore 7 Copel 8 Copel 9 Adm 10 Fore 11 Frive 2 Main 3 Unsi 4 Inter 5 Scorr 1 Prive 2 Abcor 3 Unse 4 Inter 5 Cor 6 Ener 7 Ener 7 Ener <td>titutional Capacity</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	titutional Capacity								
3 Adm 4 Adm 5 Gova 6 Press 7 Press 8 Sorr 1 Prof 1 Prof 1 Prof 2 Skill 1 Prof 2 Skill 3 Adm 4 Illitte 5 Acces 6 Acces 7 Const 6 Inver 7 Coss 6 Inver 1 Print 2 Alters 4 Doute 5 Scorr 6 Inver 7 Tenvint	dy of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
a Adm s Govession s Govession s Govession a Score a Score a Score a Prof a Prof a Covession b Covession a Covession a Covession a Covession b Covession a Covession b Covession a Covession b Covession a Covession b Covession	erational rules	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
§ Gové § Gové § Pres § Pres § Pres § Serves § Pres § Serves § Serves § Skill § Skill § Skill § Serves § Serves § Serves § Main § Serves	ministrative agencies	None	State	District	Mandal	Habitational	41	0.1667	6.833333
Press Scorn 3 Hurr 1 Prof 3 Hurr 1 Prof 2 Skill 2 Skill 2 Skill 3 Hurr 2 Skill 3 Hurr 4 Hillitt 5 Acces 4 Hillitt 5 Acces 6 Scorn 1 Open 2 Main 3 Adapt 4 Hurr 5 Acces 6 Dist 7 Loss 8 Hour 9 Corn 10 Scorn 11 Print 12 Acces 13 Adapt 14 Dist 15 Scorn 16 Ener 17 Scorn 10	ministrative processes	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
Scon Scon 1 Prof 1 Prof 2 Skill 3 Unsi 4 Inite 3 Unsi 4 Inite 4 Inite 5 Scon 6 Inite 7 Inite 8 Scon 9 Inite 9 Inite 10 Inite 11 Oper 12 Main 13 Adap 14 Inite 15 Scon 16 Privi 17 Inste 18 Scon 19 Scon 10 Scon 11 Privi 12 Asse 13 Unse 14 Privi 15 Scon 16 Privi 18 Scon 19	vernance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
B Hurr 1 Prof 2 Skill 2 Skill 3 Unsi 4 Image: Signal S	esence of NGOs	None	Low	Medium	High	Very High	35	0.1667	5.833333
1 Prof 1 Prof 2 Skill 3 Unsl 4 Intervention 4 Intervention 4 Intervention 4 Intervention 5 Score 5 Score 5 Score 6 Intervention 1 Prix 5 Score 5 Score 6 Intervention 7 Loss 3 Deprivention 4 Oute 3 Deprivention	ore Institutional Capacity					$\sum C_{ij} w_j$		1	45.33333
2 Skill 2 Skill 3 Unsl 4 Illitt 5 Acces 6 Score 7 Issee 8 Unsl 9 Illitt 9 Acces 9 Score 1 Priv. 2 Main 1 Priv. 2 Main 1 Priv. 2 Main 3 User 4 Budges 5 Score 1 Priv. 2 Masse 3 User 4 Budges 5 Formation and acces 5 Acces 6 Inver 2 Acces 3 Dopt 3 Dopt 3 Core 3 Dopt 3 Score	man Resources Capacity (service p	rovider)							
a a a a a a a a a a a a a a a a a a a a a a a a a a b a b a b a a a b b b b b b b b b b b b c b c b c b c b c b c b c b c b c b c b c c c c c c	ofessionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	61	0.2	12.2
a a a a a a a a a a a a a a a a a a a a a a a a a a b a b a b a a a b b b b b b b b b b b b c b c b c b c b c b c b c b c b c b c b c c c c c c				Health Scientist	Health Scientist	Health Scientist			
a a a a a a a a a a a a a a a a a a a a a a a a a a b a b a b a a a b b b b b b b b b b b b c b c b c b c b c b c b c b c b c b c b c c c c c c					Engineer	Engineer			
a a a a a a a a a a a a a a a a a a a a a a a a a a b a b a b a a a b b b b b b b b b b b b c b c b c b c b c b c b c b c b c b c b c c c c c c						Lawyer			
a a a a a a a a a a a a a a a a a a a a a a a a a a b a b a b a a a b b b b b b b b b b b b c b c b c b c b c b c b c b c b c b c b c c c c c c						Public relations manager			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c	illed Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	45	0.2	9
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c				Laboratory technician	Laboratory technician	Laboratory technician			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c				Water systems operator	Water systems operator	Water systems operator			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c					Health Inspector	Health Inspector			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c					Administratrive assistant	Administratrive assistant			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c					Water meter leader	Water meter leader			
a a a a a a b a c a c a c a c a c a c a c a c a c a c a c a c a c b c a c b c a c b c b c b c b c b c b c b c b c c c c c c c c c c c c c c c c						IT technician			
s Acces 4 Tech 4 Tech 4 Tech 1 Oper 2 Main 2 Main 3 Adaption 3 Adaption 3 Adaption 4 Main 5 Sconn 6 Buddy 5 Acces 6 Inversion 7 Loss 3 Deprivation 4 Buddy 5 Form 6 Inversion 7 Loss 10 Sconn 10 Sconn	skilled Labor	Craftsman		Clerk			75	0.2	15
s Acces 4 Tech 4 Tech 4 Tech 1 Oper 2 Main 2 Main 3 Adaption 3 Adaption 3 Adaption 4 Main 5 Sconn 6 Buddy 5 Acces 6 Inversion 7 Losson 3 Deprivation 4 Buddy 5 Acces 6 Inversion 6 Inversion 7 Losson 10 Sconne 10 Oute 10 Sconne			Mechanic assistant	Water meter reader					
s Acces 4 Tech 4 Tech 4 Tech 1 Oper 2 Main 2 Main 3 Adaption 3 Adaption 3 Adaption 4 Main 5 Sconn 6 Buddy 5 Acces 6 Inversion 7 Losson 3 Deprivation 4 Buddy 5 Acces 6 Inversion 6 Inversion 7 Losson 10 Sconne 10 Oute 10 Sconne				Water systems worker					
Score Score 1 Open Tech 1 Open A 1 Open A 2 Main A 2 Main A 3 Adap A 4 Main A 5 Distribution A 4 March A 5 Com A 6 Inversion Score 6 Inversion Score 7 Iosta Score 8 Dente Score 9 Dott Score 1 Print Score 2 Alter Out 4 Dott Score	terate	Caretaker	Caretaker				70	0.2	14
4 Tech 1 Oper 1 Oper 2 Mairi 3 Adaption 3 Adaption 4 Budg 5 Mairi 6 Scond 1 Prive 2 Marrier 3 User 4 Budg 5 Scond 6 Investor 7 Loss 3 Dept 4 Outs 5 Assection	cess to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
1 Oper 1 Oper 2 Main 3 Adap 5 Main 5 Sono 1 Priv. 3 Marin 4 Budg 3 Marin 4 Budg 5 Scono 3 Marin 4 Budg 5 Scono 6 Inversion 1 Print 2 Alter 3 Oper 4 Oper 5 Scono	ore Human Resources Capacity					$\sum C_{ij} w_j$		1	62.4
a a a a b a c a c b c b c b c b c b c b c b c b c b c b c b c c	chnical Capacity								40
a Adaş a Adaş s Main s S s S s S s S s S s S s S a User a User a Budg a Budg b Asse a Inversion b Finite c Inversion c Inversion c Inversion a Dependent a Dependent a Dependent a Dependent a Dependent	erations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	50	0.2	10
a Adaş a Adaş s Main s S s S s S s S s S s S s S a User a User a Budg a Budg b Asse a Inversion b Finite c Inversion c Inversion c Inversion a Dependent a Dependent a Dependent a Dependent a Dependent				Control Water Quality	Control Water Quality	Control Water Quality			
a Adaş a Adaş s Main s S s S s S s S s S s S s S a User a User a Budg a Budg b Asse a Inversion b Finite c Inversion c Inversion c Inversion a Dependent a Dependent a Dependent a Dependent a Dependent					Control Pipes	Monitor pipes network			
a Adaş a Adaş s Main s S s S s S s S s S s S s S a User a User a Budg a Budg b Asse a Inversion b Finite c Inversion c Inversion c Inversion a Dependent a Dependent a Dependent a Dependent a Dependent						Monitor Treatment	40		
s Main s Main s Distribution s Distribution s Distribution s Distribution a Sconvertein a Budges s Inversion a Depending a Depending s Conversion	aintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
s Main s Main s Distribution s Distribution s Distribution s Distribution a Sconvertein a Budges s Inversion a Depending a Depending s Conversion			Minor repair	Major repair	Major repair	Check/maintain network Check/maintain meter			
s Main s Main s Distribution s Distribution s Distribution s Distribution a Sconvertein a Budges s Inversion a Depending a Depending s Conversion					Maintain pipes				
s Main s Main s Distribution s Distribution s Distribution s Distribution a Sconvertein a Budges s Inversion a Depending a Depending s Conversion	aptation	None	Rarely	Occasionally	lleually	Maintain IT systems	40	0.2	8
s Distri Score a Construction a Cons		None			Usually	Frequently	61	0.2	12.2
Score 1 Score 2 Mar 3 User 4 Budg 5 Score 6 Investor 7 Loss 8 Score 9 Investor 9 Investor 1 Primer 2 Alter 2 Alter 3 Depet 4 Outat 5 Score	aintenance network stribution network	None	State Regional Supplier	District District Supplier	Mandal Mandal Supplier	Habitational Habitational Supplier	55	0.2	12.2
5 Econ 1 Privity 2 Maren 3 User 3 User 4 Budg 5 S 5 S 6 Invex 6 Invex 6 Econ 7 Loss 8 Convex 9 Alter 9 Alter 9 Cotta 2 Alter 3 Deped 4 Outa 5 Corr	stributon network	None	Regional Supplier	District Supprier	District Approved	District Approved	55	0.2	11
5 Econ 1 Privity 2 Maren 3 User 3 User 4 Budg 5 S 5 S 6 Invex 6 Invex 6 Econ 7 Loss 8 Convex 9 Alter 9 Alter 9 Cotta 2 Alter 3 Deped 4 Outa 5 Corr	are Technical Canacity				District Approved			1	49.2
1 Privity 2 Mar 3 User 4 Budg 5 Asse 6 Inversion 7 Cost 8 Scorr 1 Print 1 Print 2 Alter 3 Dependent 4 Outration 5 Scorr 6 Inversion	ore Technical Capacity Donomical and Financial Capacity					$\sum C_{ij} w_j$		-	45.2
2 Mar 3 User 4 Budg 5 Asse 6 Inve 7 Loss 8 Conv 9 Conv 10 Conv 11 Prim 12 Alter 13 Depa 14 Outration	ivate sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
3 User 4 Budg 5 Asse 6 Inversion 7 Loss 8 Scon 6 Ener 1 Prim 2 Alter 3 Depe 4 Outa 5 Con	arket incentives	None	Low	Medium	High	Very high	45	0.14	6.428571
 Budg Budg Budg Asse Asse Inve Loss Zon Scon Ener Prim Alter Depe Quta Scon Scon 	er fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
 Asse Inve Loss Scon Prim Alter Depe Scon Scon Scon Tenvin 		None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	40	0.14	5.714286
 Inve Loss Scon Ener Prim Alter Depe Outa Scon Scon Envin 	set values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	7.142857
7 Loss Scon 6 Ener 1 Prim 2 Alter 3 Depe 4 Outa 5con 7 Envir				Equipment	Equipment	Equipment	50	0.14	
7 Loss Scon 6 Ener 1 Prim 2 Alter 3 Depe 4 Outa 5con 7 Envir					Cash	Cash - Stocks			
7 Loss Scon 6 Ener 1 Prim 2 Alter 3 Depe 4 Outa 5con 7 Envir	vestment activities	None	Low	Medium	High	Very High	50	0.14	7.142857
Scon Ener Prim Alter Alter Depe Scon Envir		Very High		Medium	Low	None	50	0.14	
6 Ener 1 Prim 2 Alter 3 Depe 4 Outa 5com 7 Envi	pre Economical and Financial Capac		Ť			$\sum C_{ij} w_i$		1	48
 Prim Alter Depe Outa Scon Envir 	ergy Capacity								
 2 Alter 3 Depe 4 Outa 5 Con 7 Envir 	mary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	61	0.25	15.25
3 Depe 4 Outa 5con 7 Envi	ternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	45	0.25	11.25
4 Outa Scon 7 Envi	pendence for service	Very low	Low	Medium	High	Very High	50	0.25	12.5
Scon 7 Envi	itage rate	Very High	High	Medium	Low	Very low	45	0.25	11.25
7 Envi	ore Energy Capacity		-			$\sum C_{ij} w_i$		1	50.25
-	vironmental and Ecological Capacity	y							
	vironment quality	Very low	Low	Medium	High	Very high	61	0.2	12.2
2 Size	e of resource system	Very low	Low	Medium	High	Very high	50	0.2	10
	edictability of resource dynamics	Very low	Low	Medium	High	Very high	50	0.2	10
	owth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	55	0.2	11
-	source sensibility	Very low	Low	Medium	High	Very High	55	0.2	11
	ore Environmental Capacity					$\sum C_{ij} w_j$		1	54.2
_									
	cial and Cultural Capacity	Very low	Low	Intermediate	High	Very high	55	0.2	11
					High	Very high	70	0.2	14
3 Equi	mmunal ownership	Very low	Low	Intermediate					
	mmunal ownership litical stability	Very low Very low	Low	Intermediate Intermediate					14
	mmunal ownership litical stability uity	Very low	Low	Intermediate	High	Very high	70	0.2	
Scon	mmunal ownership litical stability								14 11 14

				ē	10.1				
	Consolity Easters	1-20	21-40	41-60	ned Scoring 61-80	81-100	Coore	Weight	CF score
1	Capacity Factors Service Capacity	1-20	21-40	41-60	61-80	81-100	Score	weight	CF score
	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	35	1	35
fi	Score Service Capacity	1201/0/0	20 101/0/0	10 00 1/ p/ u	00 00 1/ 0/ 0	$\sum C_{ij} w_j$	55	1	35
2	Institutional Capacity					2-1-1			
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₅	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C26	Presence of NGOs	None	Low	Medium	High	Very High	35	0.1667	5.833333
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	53.33333
_	Human Resources Capacity (service pr								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	81	0.2	16.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
0						Public relations manager			9
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	45	0.2	9
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator Health Inspector	Water systems operator Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			80	0.2	16
C33		crantonian	Mechanic assistant	Water meter reader				0.2	10
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				80	0.2	16
	Access to Higher Education	None	State	Regional	District	Mandal	70	0.2	14
f_3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	71.2
4	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	60	0.2	12
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	55	0.2	11
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C45	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	61	0.2	12.2
c	Come Technical Compatibu				District Approved	District Approved		1	56.2
/4	Score Technical Capacity Economical and Financial Capacity					$\sum C_{ij} w_j$		1	30.2
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
C52	Market incentives	None	Low	Medium	High	Very high	60	0.14	
C ₅₃	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	55	0.14	
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	60	0.14	
	Asset values	None	Real Estate	Real estate	Real estate	Real estate	65	0.14	
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
		None	Low	Medium	High	Very High	60	0.14	8.571429
C57		Very High	High	Medium	Low	None	45	0.14	
fs -	Score Economical and Financial Capaci	ity				$\sum C_{ij} w_j$		1	60.85714
-	Energy Capacity								-
	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	81	0.25	20.25
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	75	0.25	18.75
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	60	0.25	
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	70	0.25	
16	Score Energy Capacity Environmental and Ecological Capacity					$\sum C_{ij} w_j$		1	71.5
	* • •	1	Low	Modium	High	Vory high	45	0.2	0
C ₇₁ C ₇₂	Environment quality Size of resource system	Very low Very low	Low	Medium Medium	High High	Very high Very high	45	0.2	
		Very low	Low	Medium	High	Very high	30	0.2	
	Growth or replacement rate	Very Negati		Stable	Positive	Very Positive	40	0.2	
	Resource sensibility	Very low	Low	Medium	High	Very High	50	0.2	
f7	Score Environmental Capacity	.,			, in the second s	$\sum C_{ij} w_j$		1	41
8	Social and Cultural Capacity								
	Communal ownership	Very low	Low	Intermediate	High	Very high	65	0.2	13
C ₈₂	Political stability	Very low	Low	Intermediate	High	Very high	50	0.2	10
	Equity	Very low	Low	Intermediate	High	Very high	65	0.2	13
C ₈₄	Leadership/entrepreneurship	Very low	Low	Intermediate	High	Very high	70	0.2	14
	Participation of women	Very low	Low	Intermediate	High	Very high	50	0.2	10
C ₈₅	Participation of women								

Appendix.IV.F.1: Chouttupal Mandal – Chouttupal

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity	1 20		12.00	01.00		500.0	i cigitt	er store
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 I/p/d	60 - 80 I/p/d	> 80 l/p/d	30	1	30
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	30
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	55	0.1667	9.166667
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667 11.66667
C ₂₅	Governance Presence of NGOs	None None	State Low	District Medium	Mandal	Habitational	70	0.1667	6.833333
C ₂₆	Score Institutional Capacity	None	LOW	meurum	High	Very High $\sum C_{ij} w_j$	41	0.1007	0.8355555 56
3	Human Resources Capacity (service p	rovider)				<u></u>			50
	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	75	0.2	15
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	61	0.2	12.2
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant Water meter leader	Administratrive assistant Water meter leader			
					water meter reader	IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			80	0.2	16
~33			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				80	0.2	16
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	71.4
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	70	0.2	14
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Monitor Treatment Check/maintain water systems	60	0.2	12
C42	Mantenance	NOTE	Minor repair	Major repair	Major repair	Check/maintain network	00	0.2	12
			innor repuir	indjor repuir	Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	50	0.2	10
C45	Maintenance network	None	State	District	Mandal	Habitational	70	0.2	14
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	55	0.2	11
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	61
	Economical and Financial Capacity								
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	50	0.14	7.142857
C52	Market incentives User fees	None None	Low	Medium	High	Very high	70 45	0.14	10 6.428571
C ₅₃ C ₅₄	Budget	None	Uniform flat rate Basic accounting	Single block rate Annual	Increasing block rate Tracked bi-annually	Increasing block rate Tracked quarterly	45 50	0.14	7.142857
C54 C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	70	0.14	10
~55				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	65	0.14	9.285714
C57	Loss to corruption	Very High	High	Medium	Low	None	10	0.14	1.428571
fs .	Score Economical and Financial Capac	ity				$\sum C_{ij} w_j$		1	51.42857
6	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	70	0.25	17.5
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	65	0.25	16.25
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	50	0.25	12.5
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	40	0.25	10
<u></u>	Score Energy Capacity					$\sum C_{ij} w_j$		1	56.25
7	Environmental and Ecological Capacity		Low	Medium	High	Very high	60	0.2	12
C ₇₁ C ₇₂	Environment quality Size of resource system	Very low Very low	Low	Medium	High High	Very high	30	0.2	6
	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	20	0.2	4
C		Very Negat	Negative	Stable	Positive	Very Positive	30	0.2	6
C ₇₃ C ₇₄	Growth or replacement rate			Medium	High	Very High	40	0.2	8
C ₇₄	Growth or replacement rate Resource sensibility	Very low	Low		-				36
C ₇₄		Very low	LOW			$\sum C_{ij} w_j$		1	
C ₇₄ C ₇₄	Resource sensibility	Very low	Low			$\sum C_{ij} w_j$		1	
C ₇₄ C ₇₄ f 7 8 C ₈₁	Resource sensibility Score Environmental Capacity	Very low Very low	Low	Intermediate	High	∑C _{ij} w _j Very high	45	0.2	9
C ₇₄ C ₇₄ f ₇ 8	Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very low Very low	Low		High		45	0.2	9
C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂ C ₈₃	Resource sensibility <u>Score Environmental Capacity</u> Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low	Low	Intermedia te Intermedia te Intermedia te		Very high	45 40	0.2	9 8
C ₇₄ C ₇₄ f ₇ C ₈₁ C ₈₂ C ₈₃ C ₈₄	Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	Very low Very low Very low Very low	Low Low Low Low	Intermediate Intermediate Intermediate Intermediate	High High High	Very high Very high Very high Very high	45 40 70	0.2 0.2 0.2	9 8 14
C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂ C ₈₃	Resource sensibility <u>Score Environmental Capacity</u> Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low	Low Low Low	Intermedia te Intermedia te Intermedia te	High High	Very high Very high Very high	45 40	0.2	9 8

Appendix IV.G.1: Devarkonda Mandal – Devarkonda

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	25	1	25
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	25
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C23	Administrative agencies	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	61	0.1667	10.16667
C ₂₅	Governance	None	State	District	Mandal	Habitational	55	0.1667	9.166667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	15	0.1667	2.5
f2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	47.83333
3	Human Resources Capacity (service p								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	61	0.2	12.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
~						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	41	0.2	8.2
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant Water meter leader	Administratrive assistant			
			l		water meter leader	Water meter leader IT technician			
Ce:	Inskilled Jahor	Crafteman	Clerk	Clerk		n technician	60	0.2	12
C ₃₃	Unskilled Labor	Craftsman	Clerk Mechanic assistant	Water meter reader			60	0.2	12
			weename assistant						
C34	Illiterate	Caretaker	Caretaker	Water systems worker			60	0.2	12
	Access to Higher Education	None	State	Regional	District	Mandal	65	0.2	13
C35	Score Human Resources Capacity	None	State	Regional	District	$\sum C_{ij} w_{j}$	05	0.2	57.4
4	Technical Capacity					Zeijwj		1	57.4
	Operations	Water Lise	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	61	0.2	12.2
C41	operations	Water obe	r uniping trater	Control Water Quality	Control Water Quality	Control Water Quality	01	0.2	12.2
				control match quarty	Control Pipes	Monitor pipes network			
					control ripes	Monitor Treatment			
Cin	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	45	0.2	9
C42	mannenance		Minor repair	Major repair	Major repair	Check/maintain network	10	0.2	
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
	Maintenance network	None	State	District	Mandal	Habitational	55	0.2	11
	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	55	0.2	11
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	51.2
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
C52	Market incentives	None	Low	Medium	High	Very high	45	0.14	6.428571
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	30	0.14	4.285714
	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	65	0.14	9.285714
				Equipment	Equipment	Equipment			
						Cash - Stocks			
~ 1					Cash				
	Investment activities	None	Low	Medium	High	Very High	45		6.428571
	Loss to corruption	Very High		Medium Medium		Very High None	45 65		9.285714
C57 fs	Loss to corruption Score Economical and Financial Capac	Very High			High	Very High			
C ₅₇ fs 6	Loss to corruption Score Economical and Financial Capac Energy Capacity	Very High <i>ity</i>	High	Medium	High Low	Very High None ∑C _{ij} wj	65	0.14 1	9.285714 51.57143
C ₅₇ fs 6 C ₆₁	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source	Very High <i>ity</i> None	High Non-conventional	Medium Conventional electricity	High Low Electricity mid-voltage	Very High None $\sum C_{ij} w_j$ Electricity high voltage	65 70	0.14 1 0.25	9.285714 51.57143 17.5
C ₅₇ fs 6 C ₆₁ C ₆₂	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	High Low Electricity mid-voltage Generator < 50 HP	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	65 70 65	0.14 1 0.25 0.25	9.285714 51.57143 17.5 16.25
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption <u>Score Economical and Financial Capac</u> <u>Energy Capacity</u> Primary source Alternative source Dependence for service	Very High ity None None Very Iow	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	High Low Electricity mid-voltage Generator < 50 HP High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	65 70 65 50	0.14 1 0.25 0.25 0.25	9.285714 51.57143 17.5 16.25 12.5
C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	Very High ity None None	High Non-conventional None	Medium Conventional electricity Generator < 10 HP	High Low Electricity mid-voltage Generator < 50 HP	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	65 70 65	0.14 1 0.25 0.25	9.285714 51.57143 17.5 16.25 12.5 11.25
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	Very High ity None None Very Iow Very High	High Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	High Low Electricity mid-voltage Generator < 50 HP High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	65 70 65 50	0.14 1 0.25 0.25 0.25	9.285714 51.57143 17.5 16.25 12.5
C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} 7	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	Very High ity None None Very low Very High	High Non-conventional None Low High	Medium Conventional electricity Generator < 10 HP Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High $\sum C_{ij} w_j$	65 70 65 50 45	0.14 1 0.25 0.25 0.25 0.25 0.25 1	9.285714 51.57143 17.5 16.25 12.5 11.25
C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very High <i>ity</i> None None Very Iow Very High Very Iow	High Non-conventional None Low High Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high	65 70 65 50 45 45	0.14 1 0.25 0.25 0.25 0.25 1 0.25	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9
C ₅₇ fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	65 70 65 50 45 	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 12 11.25 12.5 11.25 12.
C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73}	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	Very High Ity None None Very low Very High Very low Very low Very low Very low	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high	65 70 65 50 45 45 60 50	0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 12 12 10
C_{57} f_5 G_{61} C_{62} C_{63} C_{64} C_{64} f_6 C_{71} C_{72} C_{72} C_{73} C_{74}	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very High Ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Negat	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High Positive	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive	65 70 65 50 45 45 60 50 55	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 9 12 10 10
C_{57} f_5 G_{61} C_{62} C_{63} C_{64} C_{64} f_6 C_{71} C_{72} C_{72} C_{73} C_{74}	Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High Ity None None Very low Very High Very low Very low Very low Very low	High Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High	Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very Positive Very High	65 70 65 50 45 45 60 50	0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 9 9 12 10 10 11
C_{57} f_3 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} C_{74} C_{74}	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High Ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Negat	High Non-conventional None Low High Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High Positive	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very Positive	65 70 65 50 45 45 60 50 55	0.14 1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 9 12 10 10
C_{57} f_5 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} f_7 F_7	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Dutage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Negative Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very high Very High $\sum C_{ij} w_j$	65 70 65 50 45 60 50 55 60	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 9 12 10 11 10 11 12 54
C_{57} f_5 f_6 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 f_7 R_{74} R_{7	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Social and Cultural Capacity Communal ownership	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	65 70 65 50 45 45 60 50 55 60 50 50 50 50 50 50 50 60	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 9 12 10 11 12 54 74 12 12 12 12 12 12 12 12 12 12
C ₅₇ fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ C ₇₄ R C ₈₁ C ₈₂	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Anivornental Capacity Scolal and Cultural Capacity Communal ownership Political stability	Very High ity None Very low Very low Very low Very low Very low Very low Very low Very low Very low	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High Positive High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very High Very High Very High Very high Very high	65 70 65 50 45 60 50 55 60 55 60 80 80 80 80 80 80 80 80 80 80 80 80 80	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 11.25 57.5 9 12 10 11 12 54 12 12 10 11 12 12 10 11 12 12 13
C ₅₇ f 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₄ C ₇₄ C ₇₄ C ₇₄ 7 8 C ₈₁ C ₈₂ C ₈₃	Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environmental quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very High Ity None None Very low Very High Very low Very low	High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very High $\sum C_{ij} w_j$ Very High Very High Very High Very high Very high	65 70 65 50 45 60 50 55 60 55 60 60 65 65	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 12.5 11.25 57.5 9 12 10 11 12 54 74 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75 75
C ₅₇ f 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ 7 C ₇₄ C ₇₄ 7 C ₇₄ 8 C ₈₁ C ₈₂ C ₈₃ C ₈₄	Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Anivornental Capacity Scolal and Cultural Capacity Communal ownership Political stability	Very High ity None Very low Very low Very low Very low Very low Very low Very low Very low Very low	High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Intermediate Intermediate	High Low Electricity mid-voltage Generator < 50 HP High Low High High Positive High High High	Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very High Very High Very High Very High Very high Very high	65 70 65 50 45 60 50 55 60 55 60 80 80 80 80 80 80 80 80 80 80 80 80 80	0.14 1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	9.285714 51.57143 17.5 16.25 11.25 57.5 9 12 10 11 12 54 12 12 10 11 12 12 10 11 12 12 13

Appendix IV.H.1: Huzurnagar Mandal – Huzurnagar

Partitioned Scoring Capacity Factors 1-20 21-40 41-60 61-80 81-100 core Weight CF score 1 Service Capacity 60 - 80 l/p/d 20 - 40 l/p/d 40 - 60 l/p/d 80 l/p/d 50 ffective service level 20 l/p/d 50 50 $EC_{ii}w$ 2 Institutional Capacity Intermediate Complete Advanced 0.1667 10.83333 Body of legislation Basic 65 None Operational rules Basic ntermediate Advanced 65 0.1667 10.83333 Complete lone Administrative agencies District Habitational 0.1667 State Mandal 60 None 1(Administrative processes 50 0.1667 8.333333 Basic Complete Advanced None Intermediate 11.66667 70 0.1667 Governance Habitational None State District Mandal Presence of NGOs Verv High 25 0.1667 4.166667 lone Low Medium High 55.83333 ore Institutional C $C_{ij}w$ 3 Human Resources Capacity (service provider) Administrative manage Administrative manager 13 Professionals None None Administrative supervisor 65 0.2 Health Scientist Health Scientist Health Scientist Engineer Engineer Lawyer Public relations manager C₃₂ Skilled Labor None Mechanic Maintenance technician Maintenance technician Maintenance technician 60 0.2 12 laboratory technician aboratory technician Laboratory technician Water systems operator Water systems operator Water systems operator Health Inspector Health Inspector Administratrive assistant Administratrive assistant Water meter leade Water meter leader T technician Unskilled Labor Craftsman Clerk lerk 85 0.2 17 Mechanic assistant Water meter reader Water systems worker C₃₄ Illiterate Caretaker Caretake 0.2 18 90 Access to Higher Education Mandal 65 13 State Regional District 0.2 lone C ...w 73 ore Humar 4 Technical Capacity 70 14 Operations Water Use Pumping Water Pumping Water Monitor water systems Monitor water systems 0.2 Control Water Quality Control Water Quality Control Water Quality Control Pipes Monitor pipes network Monitor Treatment C42 Maintenance 65 Check/maintain water systems None Clean water systems Check water systems Check/maintain water systems 0.2 13 Minor repair Major repair Maior repair Check/maintain network Maintain pipes Check/maintain meter Maintain IT systems C43 Adaptation lone Rarely Occasionally Usually Frequently 45 0.2 Maintenance network lone State District Mandal Habitational 65 0.2 13 Distribution network lone Regional Supplier District Supplier Mandal Supplier Habitational Supplier 60 0.2 12 District Approved District Approved $\sum C_{ij} w$ 61 5 Economical and Financial Capacity Private sector investment State Regional District Mandal 6 0.14 9.285714 lone Market incentives on 0w/ dium High Very high 50 0.14 7 142857 User fees Uniform flat rate Single block rate ncreasing block rate ncreasing block rate 30 4.285714 lone 0.14 Basic accounting Tracked bi-annually Budget lone Tracked quarterly 55 0.14 7.857143 nnual Asset value Real Estate eal estate Real estate Real estate 75 10.71429 0.14 Equipment Equipment Equipment Cash - Stocks Cash 7.857143 C₅₆ Investment activities /ledium High Very High 55 0.14 None Low 6.428571 Loss to corruption Very High High Medium None 45 0.14 Low $C_{ij}w$ 53.57143 6 Energy Capacity Conventional electricity Electricity mid-voltage Electricity high voltage Non-conventional 0.25 17.5 Primary source 70 None 0.25 70 Alternative source Generator < 10 HP Generator < 50 HP Generator > 50 HP 17.5 C. None None 16.25 Dependence for service Very low Low Medium High Very High 65 0.25 55 0.25 13.75 Outage rate /erv High High Medium Low Verv low ore Energy C ...w 65 7 Environmental and Ecological Capacity Environment quality /ery low Medium High Very high 40 0.2 Low Size of resource system /erv low Low Medium High Verv high 45 0.2 Predictability of resource dynamics Very low Low Medium High Very high 50 0.2 10 Growth or replacement rate /ery Negat Negative Stable Positive Very Positive 45 0.2 9 Resource sensibility /erv low Medium ligh Very High 60 0.2 12 $\sum C_{ij} w$ 48 ore Enviro 8 Social and Cultural Capacity 45 Communal ownership ery low Intermediate High Very high 0.2 Low Political stability ery low ntermediate Very high 65 0.2 13 ow ligh /ery low ntermediate Very high 65 13 Equity Low High 0.2 .eadership/entrepreneurship ntermediate Very high 50 0.2 10 Very low Low High articipation of women Very high 50 0.2 10 ery low Low termediate ligh

Appendix IV.I.1: Marriguda Mandal – Marriguda

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Appendix IV.I.2: Marriguda Mandal – Batlapally

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity							, , , , , , , , , , , , , , , , , , ,	
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	35	1	35
f_1	Score Service Capacity					$\sum C_{ij} w_{j}$		1	35
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	45	0.1667	7.5
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₅	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C26	Presence of NGOs	None	Low	Medium	High	Very High	25	0.1667	4.166667
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	44.33333
3	Human Resources Capacity (service p	rovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	41	0.2	8.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	41	0.2	8.2
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			75	0.2	15
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				75	0.2	15
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
fa	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	58.6
4	Technical Capacity					2÷17)			
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality	-		
				,	Control Pipes	Monitor pipes network			
						Monitor Treatment			
Ce	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			-
					Maintain pipes	Check/maintain meter			
					indinita in pipes	Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	30	0.2	6
C45	Maintenance network	None	State	District	Mandal	Habitational	61	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	55	0.2	12.2
045		Home	negronar supprier	bistricesupprici	District Approved	District Approved	55	0.2	
£,	Score Technical Capacity					$\sum C_{ij} w_{j}$		1	45.2
5	Economical and Financial Capacity					2÷17)			
C51	Private sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
C52	Market incentives	None	Low	Medium	High	Very high	40	0.14	
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	25	0.14	3.571429
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	30	0.14	4.285714
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	60	0.14	
		-		Equipment	Equipment	Equipment	1		
					Cash	Cash - Stocks	1		
Cs4	Investment activities	None	Low	Medium	High	Very High	40	0.14	5.714286
		Very High		Medium	Low	None	60		8.571429
fs	Score Economical and Financial Capac		, j			$\sum C_{ij} w_j$		1	45.14286
6	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	65	0.25	16.25
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	50	0.25	12.5
C ₆₂ C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	50	0.25	12.5
	Outage rate	Very High	High	Medium	Low	Very low	70	0.25	17.5
		, mg.1	5			$\sum C_{ij} w_j$		1	58.75
C ₆₄	Score Energy Canacity					<u> </u>		-	50.75
	Score Energy Capacity Environmental and Ecological Capacity							0.2	9
C ₆₄ f ₆ 7	Environmental and Ecological Capacity		Low	Medium	High	Very high	45		
C ₆₄	Environmental and Ecological Capacity Environment quality	Very low	Low	Medium Medium	High High	Very high Very high	45 50	0.2	
C ₆₄ 6 7 C ₇₁ C ₇₂	Environmental and Ecological Capacity Environment quality Size of resource system	Very low Very low	Low	Medium	High	Very high	50	0.2	10
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	Very low Very low Very low	Low Low	Medium Medium	High High	Very high Very high	50 45	0.2 0.2	9
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very low Very low Very low Very Negat	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very Positive	50 45 45	0.2 0.2 0.2	9 9
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very low Very low Very low	Low Low	Medium Medium	High High	Very high Very high Very Positive Very High	50 45	0.2 0.2	9 9 8
C ₆₄ 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity	Very low Very low Very low Very Negat	Low Low Negative	Medium Medium Stable	High High Positive	Very high Very high Very Positive	50 45 45	0.2 0.2 0.2	<u>و</u> و ع
-64 7 -71 -72 -73 -74 -74 -74 -74 -74 -74 -74 -74	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity Social and Cultural Capacity	Very low Very low Very low Very Negat Very low	Low Low Negative Low	Medium Medium Stable Medium	High High Positive High	Very high Very high Very Positive Very High ∑C _{ij} wj	50 45 45 40	0.2 0.2 0.2 0.2 1	<u>م</u> 2 45
-64 6 7 -71 -72 -73 -74 -74 -74 -74 -74 -74 -74 -74	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low Very low Very low Very Negat Very low Very low	Low Low Negative Low Low	Medium Medium Stable Medium Intermediate	High High Positive High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	50 45 40 	0.2 0.2 0.2 1 0.2	2 2 2 45 45
C64 7 C71 C72 C73 C73 C74 C74 C74 C74 C74 C81 C82	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low Very low Very Negat Very low Very low Very low	Low Low Negative Low Low Low	Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	50 45 40 50 50	0.2 0.2 0.2 1 0.2 1 0.2 0.2	2 2 2 2 3 4 5 4 5 2 4 5 2 4 5 2 4 5 2 4 5 2 4 5 2 4 5 2 5 2
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 8 C ₈₁ C ₈₂ C ₈₃	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Socia and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very Negat Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High ΣC ₁₁ w ₂ Very high Very high Very high	50 45 40 50 50 70	0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	2 2 8 45 40 10 10 10 14
Contemporal Contem	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	Very low Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high	50 45 40 50 50 70 50	0.2 0.2 0.2 1 0.2 0.2 0.2 0.2 0.2 0.2	99 88 45 100 100 144 100
-64 6 7 -71 -72 -73 -74 -74 -74 -74 -74 -74 -74 -74	Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Socia and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very Negat Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very Positive Very High ΣC ₁₁ w ₂ Very high Very high Very high	50 45 40 50 50 70	0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	99 98 45 100 100 14

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	32	1	32
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	32
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₅	Governance	None	State	District	Mandal	Habitational	70	0.1667	11.66667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	45	0.1667	7.5
f2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	51.66667
	Human Resources Capacity (service p	· · · ·							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	45	0.2	9
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	50	0.2	10
				Laboratory technician	Laboratory technician	Laboratory technician			
_				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
_					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
C	(11-1)	Con fi	Clark	Clash		IT technician			
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			75	0.2	15
			Mechanic assistant	Water meter reader					
~				Water systems worker					45
	Illiterate	Caretaker	Caretaker				75	0.2	15
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
†3 4	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	61.2
	Technical Capacity	14/	Duran in a Mintan	Durana in a Mistan			50	0.2	10
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems Control Water Quality	50	0.2	10
				Control Water Quality	Control Water Quality				
					Control Pipes	Monitor pipes network			
C	Maintenance	News	Cl	Charles and a sector	Charle (maintain and an and an	Monitor Treatment	40	0.2	8
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	0
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
c	Adaptation	Nono	Paraly	Ossasionally	Usuallu	Maintain IT systems	30	0.2	6
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	65		13
C ₄₅	Maintenance network Distribution network	None None	State	District	Mandal Mandal Guardian	Habitational	60	0.2	13
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	60	0.2	12
c	Score Technical Capacity				District Approved	District Approved		1	49
5	Economical and Financial Capacity					$\sum C_{ij} w_j$		1	49
	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
C ₅₁ C ₅₂	Market incentives	None	Low	Medium			65	0.14	9.285714
C ₅₂ C ₅₃	User fees	None	Low Uniform flat rate	Single block rate	High Increasing block rate	Very high Increasing block rate	40	0.14	5.714286
C ₅₄	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	40	0.14	6.428571
	Asset values	None	Real Estate	Real estate	Real estate	Real estate	61	0.14	8.714286
~->>				Equipment	Equipment	Equipment	01	5.14	5.7 14200
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	45	0.1/	6.428571
		Very High		Medium	Low	None	50		7.142857
fs	Score Economical and Financial Capac		5			$\sum C_{ij} w_{j}$	55	1	55.28571
~								_	
6	Energy Capacity							0.25	16.25
	Energy Capacity Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	65	0.25	12.5
C ₆₁	Primary source	None None	Non-conventional None	Conventional electricity Generator < 10 HP	Electricity mid-voltage Generator < 50 HP	Electricity high voltage Generator > 50 HP	65 50		
C ₆₁ C ₆₂	Primary source Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	50	0.25	
C ₆₁ C ₆₂ C ₆₃	Primary source Alternative source Dependence for service	None Very low	None Low		Generator < 50 HP High	Generator > 50 HP Very High		0.25	12.5
C ₆₁ C ₆₂ C ₆₃	Primary source Alternative source	None	None	Generator < 10 HP Medium	Generator < 50 HP	Generator > 50 HP Very High Very Iow	50 50		12.5
C_{61} C_{62} C_{63} C_{64} f_6	Primary source Alternative source Dependence for service Outage rate	None Very Iow Very High	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Generator > 50 HP Very High	50 50		12.5 18.75
C_{61} C_{62} C_{63} C_{64} f_6 7	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None Very Iow Very High	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Generator > 50 HP Very High Very Iow	50 50		12.5 18.75
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None Very Iow Very High	None Low High	Generator < 10 HP Medium Medium	Generator < 50 HP High Low	Generator > 50 HP Very High Very Iow ∑C _{ij} wj	50 50 75	0.25 1	12.5 18.75 60
C_{61} C_{62} C_{63} C_{64} f_6 f_7 C_{71} C_{72}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None Very Iow Very High Very Iow	None Low High Low	Generator < 10 HP Medium Medium Medium	Generator < 50 HP High Low High	Generator > 50 HP Very High Very Iow ∑C _{ij} w _j Very high	50 50 75 45	0.25	12.5 18.75 60 9
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None Very Iow Very High Very Iow Very Iow	None Low High Low Low Low	Generator < 10 HP Medium Medium Medium Medium	Generator < 50 HP High Low High High	Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high	50 50 75 45 55	0.25 1 0.2 0.2	12.5 18.75 60 9 11
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	None Very low Very High Very low Very low Very low	None Low High Low Low Low	Generator < 10 HP Medium Medium Medium Medium Medium	Generator < 50 HP High Low High High High	Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high	50 50 75 45 55 50	0.25 1 0.2 0.2 0.2	12.5 18.75 60 9 11 10
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None Very low Very High Very low Very low Very low Very low Very Negati	None Low High Low Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive	Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high Very Positive	50 50 75 45 55 50 50	0.25 1 0.2 0.2 0.2 0.2 0.2	12.5 18.75 60 9 11 10 10
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7	Primary source Alternative source Dependence for service Outage rate Sore Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None Very low Very High Very low Very low Very low Very low Very Negati	None Low High Low Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive	Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positi ve Very High	50 50 75 45 55 50 50	0.25 1 0.2 0.2 0.2 0.2 0.2	12.5 18.75 60 9 11 10 10 10
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None Very low Very High Very low Very low Very low Very low Very Negati	None Low High Low Low Low Low Negative	Generator < 10 HP Medium Medium Medium Medium Medium Stable	Generator < 50 HP High Low High High High Positive	Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positi ve Very High	50 50 75 45 55 50 50	0.25 1 0.2 0.2 0.2 0.2 0.2	12.5 18.75 60 9 11 10 10 10
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} C_{74} f_7 R_{74} R_{74	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None Very low Very High Very low Very low Very low Very Negati Very low	None Low High Low Low Low Negative Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium	Generator < 50 HP High Low High High High High Positive High	Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high Very High Very High $\sum C_{ij} w_j$	50 50 75 45 55 50 50 60	0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 1	12.5 18.75 60 9 11 10 10 12 52
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 C_{81} C_{82}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow	None Low High Low Low Low Negative Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	Generator < 50 HP High Low High High High Positive High High	Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	50 50 75 45 55 50 50 60 60	0.25 1 0.2 0.2 0.2 0.2 0.2 1 1 0.2	12.5 18.75 60 9 111 10 10 12 52 52
C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 C_{81} C_{82}	Primary source Alternative source Dependence for service Outage rate Score Fnergy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Copacity Social and Cultural Capacity Communal ownership Political stability	None Very low Very High Very low Very low Very low Very low Very low Very low	None Low High Low Low Negative Low Low Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Generator < 50 HP High Low High High Positive High High High	Generator > 50 HP Very High Very low $\Sigma C_{ij} w_j$ Very high Very high Very Positive Very High $\Sigma C_{ij} w_j$ Very High Very high Very high	50 50 75 45 55 50 50 50 60 60 65 65	0.25 1 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2	12.5 18.75 60 9 111 100 100 12 52 52 13 13
C_{61} C_{62} C_{63} C_{64} f_6 f_7 C_{71} C_{72} C_{73} C_{74} C_{74} C_{74} C_{74} C_{74} C_{74} C_{74} C_{81} C_{82} C_{83} C_{84}	Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	None Very low Very High Very low Very low Very low Very low Very low Very low Very low Very low	None Low High Low Low Low Low Low Low Low Low Low	Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Generator < 50 HP High Low High High High Positive High High High	Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high Very high Very High $\sum C_{ij} w_j$ Very High Very high Very high Very high	50 50 75 45 55 50 50 60 60 60 65 65 65 75	0.25 1 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	12.5 18.75 60 9 111 100 102 52 52 13 13 13

Appendix IV.I.3: Marriguda Mandal – Shivannaguda

					ned Scoring		-		
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C ₁₁	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	30	1	30
<u>fr</u>	Score Service Capacity					$\sum C_{ij} w_j$		1	30
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	45		7.5
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	40	0.1667	6.666667
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	30	0.1667	5
C ₂₅	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C26	Presence of NGOs	None	Low	Medium	High	Very High	25	0.1667	4.166667
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	40.16667
3	Human Resources Capacity (service p	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	35	0.2	7
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	40	0.2	8
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
		1			Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			60	0.2	12
~55		a. a. amdii	Mechanic assistant	Water meter reader			00	0.2	12
			Weenanic assistant						
с.	Illiterate	Caretaker	Caretaker	Water systems worker			60	0.2	12
C ₃₄				Designal	District	h de vide l			12.2
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	
<u>†</u> 3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	51.2
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	35	0.2	7
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	25	0.2	5
C45	Maintenance network	None	State	District	Mandal	Habitational	61	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	55	0.2	11
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	43.2
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal			
C52	Market incentives	None	Low				61	0.14	8.714286
C53	User fees	NUTIE	LOW	Medium	High	Very high	61 30	0.14	8.714286 4.285714
	User rees	None	Uniform flat rate	Medium Single block rate					
C54	Budget				High	Very high Increasing block rate	30	0.14	4.285714
C ₅₄ C ₅₅		None	Uniform flat rate	Single block rate	High Increasing block rate	Very high	30 25	0.14 0.14	4.285714
C54 C55	Budget	None None	Uniform flat rate Basic accounting	Single block rate Annual Real estate	High Increasing block rate Tracked bi-annually Real estate	Very high Increasing block rate Tracked quarterly Real estate	30 25 21	0.14 0.14 0.14	4.285714 3.571429 3
	Budget	None None	Uniform flat rate Basic accounting	Single block rate Annual	High Increasing block rate Tracked bi-annually Real estate Equipment	Very high Increasing block rate Tracked quarterly Real estate Equipment	30 25 21	0.14 0.14 0.14	4.285714 3.571429 3
C55	Budget Asset values	None None None	Uniform flat rate Basic accounting Real Estate	Single block rate Annual Real estate Equipment	High Increasing block rate Tracked bi-annually Real estate Equipment Cash	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks	30 25 21 40	0.14 0.14 0.14 0.14	4.285714 3.571429 3 5.714286
C ₅₅	Budget Asset values Investment activities	None None None None	Uniform flat rate Basic accounting Real Estate Low	Single block rate Annual Real estate Equipment Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High	30 25 21 40 40	0.14 0.14 0.14 0.14 0.14	4.285714 3.571429 3 5.714286 5.714286
C ₅₅	Budget Asset values Investment activities Loss to corruption	None None None None Very High	Uniform flat rate Basic accounting Real Estate Low	Single block rate Annual Real estate Equipment	High Increasing block rate Tracked bi-annually Real estate Equipment Cash	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None	30 25 21 40	0.14 0.14 0.14 0.14	4.285714 3.571429 3 5.714286 5.714286 6.428571
C ₅₅ C ₅₆ C ₅₇ fs	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac	None None None None Very High	Uniform flat rate Basic accounting Real Estate Low	Single block rate Annual Real estate Equipment Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High	30 25 21 40 40	0.14 0.14 0.14 0.14 0.14	4.285714 3.571429 3 5.714286 5.714286
C ₅₅ C ₅₆ C ₅₇ f ₅ 6	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity	None None None Very High <i>ity</i>	Uniform flat rate Basic accounting Real Estate Low High	Single block rate Annual Real estate Equipment Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$	30 25 21 40 40 45	0.14 0.14 0.14 0.14 0.14 0.14 0.14 1	4.285714 3.571429 3 5.714286 5.714286 6.428571 37.42857
C ₅₅ C ₅₆ C ₅₇ f ₅ C ₆₁	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source	None None None Very High <i>ity</i> None	Uniform flat rate Basic accounting Real Estate Low High Non-conventional	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage	30 25 21 40 40 45 65	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25
C ₅₅ C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source	None None None Very High <i>ity</i> None None	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Blectricity mid-voltage Generator < 50 HP	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	30 25 21 40 40 45 65 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	None None None Very High <i>ity</i> None None Very Iow	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	30 25 21 40 40 45 65 50 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 16.25 12.5 12.5
C ₅₅ C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate	None None None Very High <i>ity</i> None None	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Blectricity mid-voltage Generator < 50 HP	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High	30 25 21 40 40 45 65 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 12.5 16.25
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None None Very High Very High None None Very Iow Very High	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	30 25 21 40 40 45 65 50 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 16.25 12.5 12.5
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_6 f_7	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None None Very High Very High None Very Iow Very High	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$	30 25 21 40 45 65 50 50 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 1	4.285714 3.571429 3 5.714286 6.428571 37.428571 37.42857 16.25 12.5 12.5 12.5 12.5 12.5
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{63} C_{64} f_6 7 C_{71}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None None None Very High None None Very Iow Very High	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very Iow $\sum C_{ij} w_j$ Very high	30 25 21 40 45 65 50 50 65 50 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None None None Very High None None Very Iow Very High Very High	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high	30 25 21 40 40 45 65 50 50 65 50 65 50 65	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 16.25 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_6 7 C_{71} C_{72} C_{73}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	None None Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow Very Iow	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high	30 25 21 40 40 45 50 50 50 65 50 50 65 50	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.4286 6.428571 16.25 12.5 12.5 12.5 12.5 12.5 12.5 12.5 1
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None None Very High Very High None None Very High Very High Very High Very How Very How Very Low Very Low Very Low Very Low Very Low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very high	30 25 21 40 45 65 50 65 50 65 50 65 70 65 70 65 70 65 70 65 70 70 70 70 70 70 70 70 70 70 70 70 70	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 57.5 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None None Very High <i>ity</i> None None Very Iow Very High Very Iow Very Iow Very Iow	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive Very High	30 25 21 40 40 45 50 50 50 65 50 50 65 50	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 16.25 57.5 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None None Very High Very High None None Very High Very High Very High Very How Very How Very Low Very Low Very Low Very Low Very Low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very high	30 25 21 40 45 65 50 65 50 65 50 65 70 65 70 65 70 65 70 65 70 70 70 70 70 70 70 70 70 70 70 70 70	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 16.25 57.5 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74} f_7	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None None Very High Very High None None Very High Very High Very High Very How Very How Very Low Very Low Very Low Very Low Very Low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive Very High	30 25 21 40 45 65 50 65 50 65 50 65 70 65 70 65 70 65 70 65 70 70 70 70 70 70 70 70 70 70 70 70 70	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 16.25 57.5 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 C_{71} C_{72} C_{73} C_{74} C_{74} f_7 8	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None None Very High Very High None None Very High Very High Very High Very How Very How Very Low Very Low Very Low Very Low Very Low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive Very High	30 25 21 40 45 65 50 65 50 65 50 65 70 65 70 65 70 65 70 65 70 70 70 70 70 70 70 70 70 70 70 70 70	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 R	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None None Very High <i>ity</i> None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\sum C_{ij} w_j$ Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$	30 25 21 40 40 40 65 50 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 65 50 50 65 50 50 50 50 50 50 50 50 50 50 50 50 50	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{72} C_{73} C_{74} C_{74} C_{74} f_7 C_{74} C_{74} C_{74} C_{81} C_{82}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Environmental Capacity Scolal and Cultural Capacity Communal ownership	None None Very High Very High None Very High Very High	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Medium	High Increasing block rate Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	30 25 21 40 40 45 50 50 50 50 50 50 50 50 50 50 50 50 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_3 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 C_{74} C_{74} f_7 C_{81} C_{83} C	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None None Very High Ity None None Very low Very low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High	30 25 21 40 40 45 50 50 50 50 50 50 50 50 50 50 50 50 50	0.14 0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 12.5 16.25 57.5 9 9 9
C_{55} C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} T C_{71} C_{72} C_{73} C_{74} C_{74} f_{7} C_{74} C_{74} f_{7} C_{81} C_{83} C_{84}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Pergy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Ocomunal ownership Political stability Equity Leadership/entrepreneurship	None None Very High <i>ty</i> None None Very low Very low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Intermediate Intermediate Intermediate Intermediate	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high	30 25 21 40 40 45 50 50 50 50 65 50 50 65 50 50 65 70 50 65 45 45 45 45 45 45 45 45 50 50 50 50 50 50 50 50 50 50 50 50 50	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
C_{55} C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} T C_{71} C_{72} C_{73} C_{74} C_{74} f_{7} C_{74} C_{74} f_{7} C_{81} C_{83} C_{84}	Budget Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Environmental and Ecological Capacity Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None None Very High Ity None None Very low Very low	Uniform flat rate Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Single block rate Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	High Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High High High High High High High	Very high Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High	30 25 21 40 40 45 50 50 50 50 50 50 50 50 50 50 50 50 50	0.14 0.14 0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	4.285714 3.571429 3 5.714286 6.428571 37.42857 16.25 12.5 16.25 57.5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9

Appendix IV.I.4: Marriguda Mandal – Anthampeta

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	86	1	86
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	86
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	80	0.1667	13.33333
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	85	0.1667	14.16667
C23	Administrative agencies	None	State	District	Mandal	Habitational	75	0.1667	12.5
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	75	0.1667	12.5
C ₂₅	Governance	None	State	District	Mandal	Habitational	85	0.1667	14.16667
C26	Presence of NGOs	None	Low	Medium	High	Very High	41	0.1667	6.833333
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	73.5
3	Human Resources Capacity (service pr	rovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	85	0.2	17
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	85	0.2	17
				Laboratory technician	Laboratory technician	Laboratory technician	<u> </u>		
				Water systems operator	Water systems operator	Water systems operator	L		
					Health Inspector	Health Inspector	<u> </u>		
					Administratrive assistant	Administratrive assistant	L		
					Water meter leader	Water meter leader	L		
						IT technician			
C ₃₃	Unskilled Labor	Craftsman		Clerk			100	0.2	20
			Mechanic assistant	Water meter reader					
				Water systems worker					
-	Illiterate	Caretaker	Caretaker				100	0.2	20
C35	Access to Higher Education	None	State	Regional	District	Mandal	95	0.2	19
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	93
	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	85	0.2	17
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	75	0.2	15
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	70		14
C ₄₅	Maintenance network	None	State	District	Mandal	Habitational	81	0.2	16.2
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	85	0.2	17
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	79.2
	Economical and Financial Capacity								
	Private sector investment	None	State	Regional	District	Mandal	85	0.14	
	Market incentives	None	Low	Medium	High	Very high	81	0.14	-
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	60	0.14	8.571429
	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	60	0.14	8.571429
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	75	0.14	10.71429
				Equipment	Equipment	Equipment			
0	to contact and a set of the				Cash	Cash - Stocks		- ·	0.20574
	Investment activities	None	Low	Medium	High	Very High	65		9.285714
C57		Very High	High	Medium	Low	None	65	0.14	9.285714
15	Score Economical and Financial Capacity	ny				$\sum C_{ij} w_j$	-	1	70.14286
	Energy Capacity	None	Non-conventional	Conventional electricit	Electricity mid-voltage	Electricity high voltage	81	0.25	20.25
	Primary source			Conventional electricity	, ,	Electricity high voltage			
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	81	0.25	20.25
	Dependence for service	Very low Very High	Low	Medium	High	Very High	70		17.5
C ₆₄	Outage rate	very High	High	Medium	Low	Very low	75	0.25	
16	Score Energy Capacity Environmental and Ecological Capacity					$\sum C_{ij} w_j$	-	1	76.75
-	Environmental and Ecological Capacity Environment quality		Low	Medium	High	Voryhigh	55	0.2	11
	Size of resource system	Very low Very low	Low	Medium	High High	Very high Very high	65	0.2	11
	Predictability of resource dynamics	Very low Very low	Low	Medium	High	Very high Very high	60		
	Growth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	60		12
	Resource sensibility	Very Negati	Low	Medium	High	Very High	70		12
-74		verylow	LOW	wedfullt	i iigii		70	0.2	
¢ .	Score Environmental Capacity					$\sum C_{ij} w_j$	-	1	62
f7	Social and Cultural Conscient			Intermediate	High	Von / high			13
f7 8	Social and Cultural Capacity	Vorulau	Louis			Very high	65	0.2	13
f7 8 C ₈₁	Communal ownership	Very low	Low	Intermediate				o -	
f7 8 C ₈₁ C ₈₂	Communal ownership Political stability	Very low	Low	Intermediate	High	Very high	70		
f7 8 C ₈₁ C ₈₂ C ₈₃	Communal ownership Political stability Equity	Very low Very low	Low Low	Intermediate Intermediate	High High	Very high Very high	70 65	0.2	13
f7 C ₈₁ C ₈₂ C ₈₃ C ₈₄	Communal ownership Political stability Equity Leadership/entrepreneurship	Very low Very low Very low	Low Low Low	Intermediate Intermediate Intermediate	High High High	Very high Very high Very high	70 65 75	0.2	13 15
f7 C ₈₁ C ₈₂ C ₈₃ C ₈₄	Communal ownership Political stability Equity	Very low Very low	Low Low	Intermediate Intermediate	High High	Very high Very high	70 65	0.2	13 15

Appendix IV.J.1: Miryalaguda Mandal – Miryalaguda Municipality

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	35	1	35
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	35
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₅	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C_{26}	Presence of NGOs	None	Low	Medium	High	Very High	31	0.1667	5.166667
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	47.66667
3	Human Resources Capacity (service pr	ovider)							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2	13
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	55	0.2	11
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
0		o (i				IT technician	l		
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			85	0.2	17
			Mechanic assistant	Water meter reader					
~				Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker				85	0.2	17
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	74.2
4	Technical Capacity								10
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	13
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
C			a			Monitor Treatment	25		-
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	35	0.2	/
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
C	A de otra ti a o	Maria	Denalis	O a a a la a a lla a	Usually.	Maintain IT systems	30	0.2	6
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	61	0.2	12.2
C ₄₅	Maintenance network Distribution network	None None	State	District	Mandal Mandal Guardian	Habitational	61	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier District Approved	01	0.2	12.2
c	Searc Technical Canacity				District Approved			1	50.4
/4 E	Score Technical Capacity Economical and Financial Capacity					$\sum C_{ij} w_j$		1	30.4
у С.,	Private sector investment	None	State	Regional	District	Mandal	65	0.14	9.285714
C ₅₁ C ₅₂	Market incentives	None	Low	Medium	High	Very high	25	0.14	3.571429
C52 C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	25	0.14	3.571429
C ₅₄	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	35	0.14	5.571425
C54 C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	7.142857
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	40	0.14	5.714286
		Very High		Medium	Low	None	45		6.428571
fs	Score Economical and Financial Capac					$\sum C_{ij} w_j$		1	40.71429
6	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	55	0.25	13.75
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	45	0.25	11.25
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	45	0.25	11.25
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	41	0.25	10.25
f6	Score Energy Capacity					$\sum C_{ij} w_j$		1	46.5
	Environmental and Ecological Capacity	1							
7		Very low	Low	Medium	High	Very high	40	0.2	8
7 C ₇₁	Environment quality			Medium	High	Very high	50	0.2	10
7 C ₇₁ C ₇₂	Environment quality Size of resource system	Very low	Low		Lliab	Very high	35	0.2	7
			Low	Medium	High	., .			
C ₇₂	Size of resource system	Very low	Low		Positive	Very Positive	40	0.2	8
C ₇₂ C ₇₃	Size of resource system Predictability of resource dynamics	Very low Very low	Low	Medium				0.2	8
C ₇₂ C ₇₃ C ₇₄	Size of resource system Predictability of resource dynamics Growth or replacement rate	Very low Very low Very Negati	Low Negative	Medium Stable	Positive	Very Positive	40		
C ₇₂ C ₇₃ C ₇₄ C ₇₄	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very low Very low Very Negati	Low Negative	Medium Stable	Positive	Very Positive Very High	40		7
C ₇₂ C ₇₃ C ₇₄ C ₇₄	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very low Very low Very Negati	Low Negative	Medium Stable	Positive	Very Positive Very High	40		7 40
C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Socie favironmental Capacity Social and Cultural Capacity	Very Iow Very Iow Very Negati Very Iow	Low Negative Low	Medium Stable Medium	Positive High	Very Positive Very High $\sum C_{ij} w_j$	40 35	0.2	7
C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Socie Anvironmental Copacity Social and Cultural Capacity Communal ownership	Very low Very low Very Negati Very low Very low	Low Negative Low Low	Medium Stable Medium Intermediate	Positive High High	Very Positive Very High $\sum C_{ij} w_j$ Very high	40 35 40 45	0.2	7 40 9 10
C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low Very Negati Very low Very low Very low	Low Negative Low Low Low	Medium Stable Medium Intermediate Intermediate	Positive High High High	Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	40 35 45 50	0.2 1 0.2 0.2 0.2	7 40 9
C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇ 8 C ₈₁ C ₈₂ C ₈₃	Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very Negati Very low Very low Very low Very low	Low Negative Low Low Low Low Low	Medium Stable Medium Intermediate Intermediate Intermediate	Positive High High High High	Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	40 35 45 50 41	0.2 1 0.2 0.2 0.2	7 40 9 10 8.2

Appendix IV.J.2: Miryalaguda Mandal – Venkatadripallam

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	45	1	45
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	45
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	55	0.1667	9.166667
C23	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₅	Governance	None	State	District	Mandal	Habitational	75	0.1667	12.5
C26	Presence of NGOs	None	Low	Medium	High	Very High	50	0.1667	8.333333
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	55
3	Human Resources Capacity (service pr	ovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	65	0.2	13
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			85	0.2	17
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				85	0.2	17
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	75.2
4	Technical Capacity								
C41	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	13
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	61	0.2	12.2
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	45	0.2	9
C45	Maintenance network	None	State	District	Mandal	Habitational	61	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	81	0.2	16.2
					District Approved	District Approved			
fa -	Score Technical Capacity					$\sum C_{ij} w_j$		1	62.6
5	Economical and Financial Capacity								
		None	State	Regional	District	Mandal	55	0.14	7.857143
	Market incentives	None	Low	Medium	High	Very high	41	0.14	5.857143
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	50	0.14	7.142857
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	65	0.14	9.285714
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
		None	Low	Medium	High	Very High	41		5.857143
C57			High	Medium	Low	None	55	0.14	7.857143
5	Score Economical and Financial Capaci	ty				$\sum C_{ij} w_j$		1	51
	Energy Capacity	News	No	Convertienel 1 1 1 1	Characteristic and a second second	Classificity, black		0.07	45.05
	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	61	0.25	15.25
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	50	0.25	12.5
	Dependence for service	Very low	Low	Medium	High	Very High	45	0.25	11.25
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	50	0.25	12.5
f6	Score Energy Capacity					$\sum C_{ij} w_j$		1	51.5
	Environmental and Ecological Capacity						-		
	Environment quality	Very low	Low	Medium	High	Very high	61	0.2	12.2
	Size of resource system	Very low	Low	Medium	High	Very high	55	0.2	11
		Very low	Low	Medium	High	Very high	50	0.2	10
	Growth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	50	0.2	10
C74	Resource sensibility	Very low	Low	Medium	High	Very High	60	0.2	12
f7	Score Environmental Capacity					$\sum C_{ij} w_j$		1	55.2
8	Social and Cultural Capacity								
	Communal ownership	Very low	Low	Intermediate	High	Very high	70	0.2	14
C ₈₁	Political stability	Very low	Low	Intermediate	High	Very high	55	0.2	11
C ₈₂				Intermediate	High	Very high	65	0.2	13
C ₈₂	Equity	Very low	Low	Interneurate		very night	05	0.2	
C ₈₂ C ₈₃ C ₈₄	Equity Leadership/entrepreneurship	Very low Very low	Low Low	Intermediate	High	Very high	70	0.2	13
C ₈₂ C ₈₃ C ₈₄	Equity								14

Appendix IV.J.3: Miryalaguda Mandal – Zapthiveeragudem

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Interfactor $0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 +$									1	
Cir. Cir. Uniterior servere se			1-20	21-40	41-60	61-80	81-100	Weight	CF score	Score
LossesLoss										
Description Note Description Descripion Descripion <thdesc< td=""><td>C11</td><td></td><td>< 20 I/p/d</td><td>20 - 40 l/p/d</td><td>40 - 60 l/p/d</td><td>60 - 80 l/p/d</td><td></td><td>1</td><td></td><td></td></thdesc<>	C11		< 20 I/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d		1		
Cy Desc D	F1						$\sum C_{ij} w_j$	1	45	<u> </u>
Cp Decisional relational										
C ₁ Mathem Nume Nume State Mathem										
Co. Mone Mat. More Mat. Mone Mat. Mone Mat. Mone Mat.										
Constrained None State Daylot Math M										
C., Prescription None	C24									
j joor Ch Profestionals Nore	C ₂₅		None	State		Mandal	Habitational			
D Interview couplet/ purpose provider) Interview couplet/ purpose provider) Interview couplet/ purpose provider	C26		None	Low	Medium	High		0.1667		
Cr. Cr. ParticulationNoneAnon	f ₂						$\sum C_{ij} w_j$	1	72.5	
Image: Some state in the st	3	Human Resources Capacity (service pr	ovider)							
Image: section of the section of t	C ₃₁	Professionals	None	None		, and the second s		0.2	75	
Case Januar Jack Lange Labor None Machanic Maintenance technic Laboratory technican Laboratory techninantin technican Laboratory techninan					Health Scientist	Health Scientist	Health Scientist			
Π Mathemane Margame Mathemane Machine Maintenance Mechnican Multic raid are mechanican						Engineer	Engineer			
Cr. Saling labor National Mathematic Modula Maintenance Modula							Lawyer			
Image: Construct of the second sec							Public relations manager			
Image: Section of the section of	C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	0.2	70	
Image Image <t< td=""><td></td><td></td><td></td><td></td><td>Laboratory technician</td><td>Laboratory technician</td><td>Laboratory technician</td><td></td><td></td><td></td></t<>					Laboratory technician	Laboratory technician	Laboratory technician			
Image Image <t< td=""><td></td><td></td><td></td><td></td><td>Water systems operator</td><td>Water systems operator</td><td>Water systems operator</td><td></td><td></td><td>1</td></t<>					Water systems operator	Water systems operator	Water systems operator			1
Image: sec: sec: sec: sec: sec: sec: sec: se							Health Inspector			
City unskilled Labor Cinc Gramma Gramma <thgramma< th=""> <thgramma< th=""> Gra</thgramma<></thgramma<>						Administrative assistant	Administrative assistant			1
Image: section of the sectin of the section of the sectin						Water meter leader	Water meter leader			
Ch unskilted Labor Carfuma Carfuma Carfuma Carfuma Carfuma Carfuma Mater systems worker Ch Accent Law Carfuma Carfuma Restantion Lassistant Values systems worker None 2 100 Ch Accent Law Rescarce Capacity None Sate Periodical Values Sate Participation Lassistant Values Systems Worker Accent Law Rescarce Capacity 0 3 3 Ch Decarding Rescarce Capacity None Sate None Rescarce Capacity Control Value regulatity Control Value regul							IT technician			
Image: Section of the section of t	C33	Unskilled Labor	Craftsman	Clerk	Clerk			0.2	100	
										l
C1.InteractCarcats										l
Co. State Regional Ostrict Value Value 0 Store Human Resource Cogardy in in Value V	C34	Illiterate	Caretaker	Caretaker				0.2	100	
inSecurityIntervalIntervalSecurityInterval <td></td> <td></td> <td></td> <td></td> <td>Regional</td> <td>District</td> <td>Mandal</td> <td></td> <td></td> <td></td>					Regional	District	Mandal			
Image: Control Logacity Image: Control Water Use Pumping Water Pumping Water Monitor water systems Monitor water systems 0.2 81 Ch Operations Water Use Pumping Water Control Water Quality	C35		None	State	Regional	District		1		
C1 C1 OperationsWater Use Pumping WaterPumping Water Control Water QualityMonitor water systems Control Water Quality0.0.281C1Control Water QualityControl Wat	3						Zeijwj	1		-
Image: Control Water Quality Control Pipes Ca Maintenance None Clean water systems Cleck/maintain water systems Cleck/maintain water systems Cleck/maintain water systems Cleck/maintain mater Z 70 Ca Mainer repair Maior repair Major repair Major repair Major repair Cleck/maintain moter Z 70 Ca Major repair Major repair <td>-</td> <td>· · ·</td> <td>Water Lice</td> <td>Rumping Water</td> <td>Pumping Water</td> <td>Monitor water systems</td> <td>Monitor water systems</td> <td>0.2</td> <td>Q1</td> <td></td>	-	· · ·	Water Lice	Rumping Water	Pumping Water	Monitor water systems	Monitor water systems	0.2	Q1	
Image: constraint of the second of the se	-41	operations	water use	Fulliping water				0.2	01	
Image: Construct of the set of the					Control water Quarty					
C ₁ Maintenance None Clear water systems Obeck/maintain water systems Check/maintain water systems Check/maintain water systems Check/maintain network I I I Incore Incore Mainor repair Mainor repair Mainor repair Check/maintain network I I I Incore Mainain IT systems Check/maintain network IC IC IC I Maintain T systems None Rarely Occasionally Kualinain T systems IC						Control Pipes				
Image Main or repair Major repair Major repair Major repair Major repair Maintain pipes Check/maintain network Image Ca Maintain ristems A Antain ristems A Antain ristems A Ca Maintain ristems None Rarely Occasionally Usually Frequenty 0.2 Antain ristems Ca Maintain ristems None Rarely Occasionally Usually Frequenty 0.2 8.00 Ca Maintain ristems None Regional Supplier District Mandal Supplier Habitational Supplier 0.2 8.00 Ca Score Technical Capacity None Regional District Approved Ver 0.2 70 Ca None Caste Regional District Approved Mandal Mandal None 8.00 76,6 Ca None Caste Regional District Approved Mandal None 8.00 70 Caste Regional None State Regional District Approved Mandal 1.4 8.00 Caste Regional None State Regional District Approved None 1.4 6.00 Caste <td>~</td> <td></td> <td></td> <td>ā i i</td> <td></td> <td>ol 17</td> <td></td> <td></td> <td>70</td> <td></td>	~			ā i i		ol 17			70	
Image: section of the secting of the secting of the secting of t	42	Maintenance	None					0.2	70	
Image: section of the sectin of the section of the section of th				Minor repair	Major repair					
C1 C2 AbstrationNoneRarely Review (Sator)OctaUsally UsallyPrequenty0.270C2 C3 C4 C4 District NaporedNoneSate Regional SupplierDistrict District SupplierMandal SupplierHabitational Supplier District Approved0.28.1C5 C5 C5Some Technical CapacityImage (Sate						Maintain pipes				
Co. Maintenance network None State District Mandal Habitational 0.2 81 Co. District Approved District Supplier Mandal Supplier Habitational Supplier 0.2 81 (I. Score Technical Capacity Image: Comparison of the state of the s										l
CLS District Supplier Mandal Supplier Habitational Supplier 0.2 81 c Score Technical Capacity Image: Common and Prancial Capacity Image: Common and Prancity Image									-	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			None	State	District	Mandal				
iScore Technical CapacityImage: score Technical Cap	C45	Distribution network	None	Regional Supplier	District Supplier			0.2	81	
S Economical and Financial Capacity None State Regional District Mandal 0.14 681 C1 private sector investment None Low Medium High Very Nigh 0.14 681 C2 Market increasing block rate Increasing block rate Increasing block rate 0.14 65 C3 User fees None Basic accounting Annual Tracked bio-annually Tracked quarterly 0.14 40 C3 Saset values None Real Estate Real estate Real estate 0.14 65 C3 Saset values None Real Estate Real estate 0.14 50 C3 Saset econandia di financial Capacity Low Medium High Very High 0.14 50 C3 Saset econandia di financial Capacity Extricity mid-voltage Electricity high voltage 0.22 90 C4 Privary source None Rener estate 10 HP Generator < 50 HP						District Approved	District Approved			
C1 Private sector investment None State Regional District Mandal 0.14 81 C2 Market incentives None Low Medium High Very high 0.14 65 C3 User fees None Basic accounting Annual Tracked bi-annually Tracked quarterly 0.14 40 C5 Asset values None Real Estate Real estate Real estate Real estate Real estate 0.14 65 C4 Investment activities None None Ker High Medium High Very High 0.14 50 C5 Investment activities None None None Mone 0.14 50 C5 Investment activities None None Medium High Medium None None 50 C5 Investment activities None None-conventoal Conventional electricity Electricity mid-voltage 52 60 C4 Primary source None None Generator < 0.1P	F4	Score Technical Capacity					$\sum C_{ij} w_j$	1	76.6	
C2 Q C3 Market incentivesNoneLowMediumHighVery high0.14655C3 C3 MoreNoneBasic accounting AnnualAnnualTracked bi-annually Tracked bi-annuallyTracked quarterly0.14400C3 C3 Asset valuesNoneReal EstateReal estateReal estateReal estateReal estateNoneAnnualTracked bi-annually Tracked bi-annuallyReal estate0.14400C3 Asset valuesNoneReal estateReal estateReal estateReal estateNoneNone100400C4 Asset valuesNoneLowMediumHighVery High0.14500<	5	Economical and Financial Capacity								
C_3 Quert feesNoneUniform flat rateSingle block rateIncreasing block rateIncreasing block rateIncreasing block rate0.1450C_4 Quert feesNoneBeal caccountingAnnualTracked bi-annuallyTracked quarterly0.1440C_5Asset valuesNoneReal EstateReal estateR	C51	Private sector investment	None	State	Regional	District	Mandal	0.14	81	
C4 C3 C3 A budgetNoneBasic accounting Real EstateAnnualTracked bi-annuallyTracked quarterly0.1440C3 C3 A set valuesNoneReal EstateReal estateReal estateReal estate0.1465C3 C4CashCashCashCashCashCash0.1465C3 C4Investment activitiesNoneLowMediumHighVery High0.1450C3 C4Score Economical and Financial CoportyMediumLowNone0.1450C4 C5 C4Score Economical and Financial CoportyMediumLowNone0.1450C5 C4 C5 C5 C4 C5 C4 C5 C5 C4 C5 C5 C5 C5 C4 C4 C5 <b< td=""><td>C52</td><td>Market incentives</td><td>None</td><td>Low</td><td>Medium</td><td>High</td><td>Very high</td><td>0.14</td><td>65</td><td></td></b<>	C52	Market incentives	None	Low	Medium	High	Very high	0.14	65	
Col Cas Asset valuesNoneReal EstateReal estate <th< td=""><td>C53</td><td>User fees</td><td>None</td><td>Uniform flat rate</td><td>Single block rate</td><td>Increasing block rate</td><td>Increasing block rate</td><td>0.14</td><td>50</td><td></td></th<>	C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	0.14	50	
ConstraintEquipmentEquipmentEquipmentEquipmentEquipmentCashCashCashCashCashCashCashCashCashCashCashCashCashCashCashSocksCashSocksCashSocksCashSocksCashSocksSocksSocksCashSocks <td>C54</td> <td>Budget</td> <td>None</td> <td>Basic accounting</td> <td>Annual</td> <td>Tracked bi-annually</td> <td>Tracked quarterly</td> <td>0.14</td> <td>40</td> <td></td>	C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	0.14	40	
$ \begin{array}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	0.14	65	
$ \begin{array}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$					Equipment	Equipment	Equipment			1
Cr fLoss to corruptionVery High HighHigh HighMediumLowNone0.1450GScore Economical and Financial CapacityIStatestripIStatestripIStatestripGEnergy CapacityINoneNoneNone-conventionalConventional electricityElectricity mid-voltageElectricity high voltage0.25660GCap 2Alternative sourceNoneNoneGenerator < 10 HPGenerator < 50 HPGenerator > 50 HP0.25665GOutage rateVery lowLowMediumHighLowVery High0.25655Cr 3Dependence for serviceVery HighHighMediumLowVery How0.252557Environmenta and Ecological CapacityVery lowLowMediumHighVery low0.225007Environment qualityVery lowLowMediumHighVery high0.225007Environment qualityVery lowLowMediumHighVery high0.225007Score fregy CapacityVery lowLowMediumHighVery high0.225007Environment qualityVery lowLowMediumHighVery high0.225007Score fregy CapacityVery lowLowMediumHighVery high0.225007Score fregy CapacityVery lowLowMedium<						Cash				1
Cs7 t loss to corruptionVery High HighHigh MediumMediumLowNone0.1450fScore Economical and Financial CopactyISore Economical CopactyIISore Economical CopactyIISore Economical CopactyIISore Economical CopactyIIIIIIIIIIIII <th< td=""><td>C56</td><td>Investment activities</td><td>None</td><td>Low</td><td>Medium</td><td>High</td><td>Very High</td><td>0.14</td><td>50</td><td></td></th<>	C56	Investment activities	None	Low	Medium	High	Very High	0.14	50	
$\frac{1}{6}$ Score Economical and Financial Capacity 1 57.28571 6 Energy Capacity 1000 None Generator < 10 HP Generator < 50 HP Generator > 50 HP 0.25 65 6 Dependence for service Very High 0.02 65 65 7 Environmental and Ecological Capacity 1 53.75 7 7 Environment quality Very High 0.22 50 7 Environment quality Very low Low Medium High Very High 0.22 50 7 Environment quality Very low Low Medium High Very High 0.22 50 7 Environment quality Very low Low Medium High Very High 0.22 50 7 St			Very High	High	Medium	Low		0.14	50	1
6 Energy Capacity Image: Constraint of the second se	f ₅							1		
Cell Primary sourceNoneNon-conventionalConventional electricityElectricity mid-voltageElectricity high voltage0.2560Ce2 Ce3Alternative sourceNoneNoneGenerator < 10 HPGenerator < 50 HP0.2565Ce3 Dependence for serviceVery lowLowMediumHighVery High0.2565Ce4 Outage rateVery HighUevyHighMediumLowVery low0.2565Ce4 Outage rateVery HighHighMediumLowVery low0.2525 7 Environment and Ecological CapacityImage and the formation of	6									
Ce2 Ce3 Ce4NoneNoneGenerator < 10 HPGenerator < 50 HPGenerator > 50 HP0.25655Ce3 Ce4 Outage rateVery lowLowMediumHighVery High0.25655Ce5 Ce4Outage rateVery HighHighMediumLowVery Iow0.25255Score Energy CapacityDDCore ΣC_{4W} 133.75Tenvironmental and Ecological CapacityDDDDDCr1Environmental and Ecological CapacityDDDDCr2 Size of resource systemVery lowLowMediumHighVery high0.250Cr3 Size of resource systemVery lowLowMediumHighVery high0.250Cr4 Growth or replacement rateVery lowLowMediumHighVery high0.250Cr4 Resource ensibilityVery lowLowMediumHighVery Nigh0.250Cr4 Resource sensibilityVery lowLowMediumHighVery Nigh0.25074 Social and Cultural CapacityVery lowLowMediumHighVery Nigh0.25075 CapacitySocial and Cultural CapacityVery lowLowMediumHighVery Nigh0.25075 CapacityVery lowLowIntermediateHighVery Nigh0.25076 Cas Social and Cultural CapacityVe			None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	0.25	60	
h_{c} Score Energy CapacityImage: constraint of the second secon										
7Environmental and Ecological CapacityMediumHighVery high0.250 C_{71} Environment qualityVery lowLowMediumHighVery high0.250 C_{72} Size of resource systemVery lowLowMediumHighVery high0.270 C_{73} Predictability of resource dynamicsVery lowLowMediumHighVery high0.250 C_{74} Growth or replacement rateVery Negati NegativeStablePositiveVery Positive0.250 C_{74} Resource sensibilityVery lowLowMediumHighVery Positive0.250 C_{74} Resource sensibilityVery lowLowMediumHighVery High0.250 $frScore Environmental CapacityLowMediumHighVery High0.250frScore Environmental CapacityLowIntermediateHighVery High0.250G_{81}Communal ownershipVery lowLowIntermediateHighVery High0.245G_{81}Communal ownershipVery lowLowIntermediateHighVery High0.260G_{81}Ladership/entrepreneurshipVery lowLowIntermediateHighVery High0.290G_{84}Participation of womenVery lowLowIntermediateHighVery High0.260$	04 F		. ,	5				1		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	<i>,</i> 7		,				<u> </u>		50.75	
$\begin{array}{c} C_{72} \\ \text{Size of resource system} \\ C_{73} \\ \text{Fredictability of resource dynamics} \\ \text{Very low} \\ \text{Very low} \\ \text{Low} \\ \text{Medium} \\ \text{High} \\ \text{High} \\ \text{Very high} \\ \text{Very high} \\ \text{Very high} \\ \text{O.2} \\ \text{O.2} \\ \text{Social and Cultural Capacity} \\ \text{Social and Cultural Capacity} \\ \text{Very low} \\ \text{Very low} \\ \text{Low} \\ \text{Medium} \\ \text{Medium} \\ \text{High} \\ \text{Very Nigh} \\ \text{Very Nigh} \\ \text{Very Nigh} \\ \text{Very Nigh} \\ \text{O.2} \\ \text{O.2} \\ \text{O.2} \\ \text{Social and Cultural Capacity} \\ \text{Social and Cultural Capacity} \\ \text{Very low} \\ \text{Low} \\ \text{Intermediate} \\ \text{High} \\ \text{Very high} \\ \text{Very high} \\ \text{O.2} \\ O.$				Low	Medium	High	Very high	0.2	50	
$ Cr_4 \ $										
f: Score Environmental Capacity I 52 8 Social and Cultural Capacity I Image: Compute Science										
8 Social and Cultural Capacity Intermediate High Very high 0.2 45 Cs1 Communal ownership Very low Low Intermediate High Very high 0.2 45 Cs2 Political stability Very low Low Intermediate High Very high 0.2 75 Cs3 Equity Very low Low Intermediate High Very high 0.2 60 Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Cs5 Participation of women Very low Low Intermediate High Very high 0.2 90	C74		very low	LOW	wedrum	i iigii		0.2		
Cs1 Communal ownership Very low Low Intermediate High Very high 0.2 45 Cs2 Political stability Very low Low Intermediate High Very high 0.2 75 Cs3 Equity Very low Low Intermediate High Very high 0.2 60 Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 60 Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Cs5 Participation of women Very low Low Intermediate High Very high 0.2 60	7						ZCijWj	1	52	-
Cs2 Political stability Very low Low Intermediate High Very high 0.2 75 Cs3 Equity Very low Low Intermediate High Very high 0.2 60 Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Cs5 Participation of women Very low Low Intermediate High Very high 0.2 90									·-	<u> </u>
Cs3 Lequity Very low Low Intermediate High Very high 0.2 60 Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Cs45 Participation of women Very low Low Intermediate High Very high 0.2 90										
Case Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Case Participation of women Very low Low Intermediate High Very high 0.2 90										
Cs4 Leadership/entrepreneurship Very low Low Intermediate High Very high 0.2 90 Cs5 Participation of women Very low Low Intermediate High Very high 0.2 90	C ₈₃									
	C ₈₄									
f_8 Score Social-Cultural Capacity 1 66	C ₈₅		Very low	Low	Intermediate	High		0.2		
	F ₈	Score Social-Cultural Capacity					$\sum C_{ij} w_i$	1	66	

Appendix IV.J.4: Miryalaguda Mandal – Chinthapally

Appendix IV.K.1: Nakrekal Mandal – Nakrekal

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	61	1	61
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	61
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C ₂₂	Operational rules	None	Basic	Intermediate	Complete	Advanced	45	0.1667	7.5
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	50	0.1667	8.333333
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	35	0.1667	5.833333
C ₂₅	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	15	0.1667	2.5
f2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	42.66667
3	Human Resources Capacity (service pr								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	61	0.2	12.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	45	0.2	9
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
~		o (i				IT technician			
C33	Unskilled Labor	Craftsman		Clerk			75	0.2	15
			Mechanic assistant	Water meter reader					
C	11114	Const 1	Constals	Water systems worker					
	Illiterate	Caretaker	Caretaker	Designal	District	Maria da I	75	0.2	15
C35	Access to Higher Education	None	State	Regional	District	Mandal	65	0.2	13
13	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	64.2
-	Technical Capacity		a				65		13
C41	Operations	water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	15
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network Monitor Treatment			
c	Maintananaa	None	Close water systems	Chask water systems	Chack/maintain water systems		50	0.2	10
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	50	0.2	10
			Minor repair	Major repair	Major repair Maintain ninos	Check/maintain network Check/maintain meter			
					Maintain pipes				
C	Adaptation	None	Rarely	Occasionally	Henally	Maintain IT systems Frequently	45	0.2	9
C ₄₃		None			Usually		43	0.2	12.2
C ₄₅ C ₄₅	Maintenance network Distribution network	None	State Regional Supplier	District District Supplier	Mandal Mandal Supplier	Habitational Habitational Supplier	55	0.2	12.2
C45	Distribution network	None	Regional Supplier	District Supplier	District Approved	District Approved	55	0.2	11
¢.,	Score Technical Capacity				District Approved	$\sum C_{ij} w_i$		1	55.2
5	Economical and Financial Capacity					Zeijwj		1	33.2
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	75	0.14	10.71429
C52	Market incentives	None	Low	Medium	High	Very high	40	0.14	
C52 C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	30	0.14	4.285714
C53 C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C54 C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	
-33				Equipment	Equipment	Equipment		0.14	
					Cash	Cash - Stocks			
C«4	Investment activities	None	Low	Medium	High	Very High	50	0.14	7.142857
		Very High		Medium	Low	None	60		8.571429
fs	Score Economical and Financial Capaci					$\sum C_{ij} w_i$		1	50.71429
6	Energy Capacity								
	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	61	0.25	15.25
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	55	0.25	13.75
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	45	0.25	11.25
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	41	0.25	10.25
fo	Score Energy Capacity					$\sum C_{ij} w_i$		1	50.5
7	Environmental and Ecological Capacity	,							
C ₇₁	Environment quality	Very low	Low	Medium	High	Very high	45	0.2	9
C ₇₂	Size of resource system	Very low	Low	Medium	High	Very high	50	0.2	10
C ₇₃		Very low	Low	Medium	High	Very high	45	0.2	9
C ₇₄	Growth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	50	0.2	10
C ₇₄	Resource sensibility	Very low	Low	Medium	High	Very High	50	0.2	10
f ₇	Score Environmental Capacity					$\sum C_{ij} w_i$		1	48
8	Social and Cultural Capacity								
C ₈₁	Communal ownership	Very low	Low	Intermediate	High	Very high	61	0.2	12.2
C ₈₁ C ₈₂	Political stability	Very low	Low	Intermediate	High	Very high	65	0.2	12.2
~62	Equity	Very low	Low	Intermediate	High	Very high	65	0.2	13
Cen			Low	Intermediate	High	Very high	50	0.2	10
C ₈₃	Leadershin/entrenneurchin			atc	· · · b''			. U.Z	10
C ₈₄	Leadership/entrepreneurship	Very low		Intermediate					12
	Leadership/entrepreneurship Participation of women Score Social-Cultural Capacity	Very low	Low	Intermediate	High	Very high $\sum C_{ij} w_{j}$	60	0.2	60

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	85	1	85
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	85
2	Institutional Capacity								
C ₂₁	Body of legislation	None	Basic	Intermediate	Complete	Advanced	75	0.1667	12.5
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	75	0.1667	12.5
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₄	Administrative processes	None	Basic	Intermediate	Complete	Advanced	81	0.1667	13.5
C ₂₅	Governance	None	State	District	Mandal	Habitational	85	0.1667	14.16667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	50	0.1667	8.333333
f2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	74.5
	Human Resources Capacity (service p								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	85	0.2	17
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
<u> </u>	Chilled Johnson	Neze	Marshawia			Public relations manager	85	0.2	17
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	85	0.2	17
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector Administratrive assistant	Health Inspector Administratrive assistant			
					Administratrive assistant Water meter leader	Water meter leader			
					water meter reduer	IT technician	-		
Can	Unskilled Labor	Craftsman	Clerk	Clerk			100	0.2	20
-33		Cransilian	Mechanic assistant	Water meter reader			100	0.2	20
			weename assistant	Water systems worker					
C34	Illiterate	Caretaker	Caretaker	water systems worker			100	0.2	20
	Access to Higher Education	None	State	Regional	District	Mandal	95	0.2	19
C35	Score Human Resources Capacity	None	State	negional	District	$\sum C_{ij} w_j$	55	1	93
4	Technical Capacity					<u>∠</u> ≠ ij… j			
	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	81	0.2	16.2
				Control Water Quality	Control Water Quality	Control Water Quality		-	-
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	81	0.2	16.2
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	75	0.2	15
C45	Maintenance network	None	State	District	Mandal	Habitational	70	0.2	14
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	85	0.2	17
					District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	78.4
	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
	Market incentives	None	Low	Medium	High	Very high	70	0.14	10
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	45	0.14	6.428571
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	65	0.14	9.285714
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	70	0.14	10
				Equipment	Equipment	Equipment			
~					Cash	Cash - Stocks			0.00
	Investment activities	None	Low	Medium	High	Very High	65		9.285714
C57		Very High	High	Medium	Low	None	45	0.14	6.428571
5	Score Economical and Financial Capac	ny l				$\sum C_{ij} w_j$		1	63
	Energy Capacity	None	Non-conventional	Conventional electricit	Electricity mid-voltage	Electricity high voltage	81	0.25	20.25
	Primary source		Non-conventional None	Conventional electricity	, ,	Electricity high voltage			20.25
	Alternative source	None	Low	Generator < 10 HP Medium	Generator < 50 HP High	Generator > 50 HP Very High	81 80	0.25	20.25
	Dependence for convice		LLVVV	wieurum				0.25	16.25
	Dependence for service	Very low		Medium			65		10.23
	Outage rate	Very Iow Very High	High	Medium	Low	Very low	65	1	76.75
C ₆₄ f ₆	Outage rate Score Energy Capacity	Very High		Medium	Low	$\sum C_{ij} w_j$	65	1	76.75
C ₆₄ f ₆ 7	Outage rate Score Energy Capacity Environmental and Ecological Capacity	Very High	High			$\sum C_{ij} w_j$		1	
C ₆₄ f 6 7 C ₇₁	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	Very High Very low	High Low	Medium	High	∑C _{ij} w _j Very high	41	0.2	8.2
C ₆₄ f ₆ 7 C ₇₁ C ₇₂	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very High Very Iow Very Iow	High			∑C _{ij} w _j Very high Very high		1	
C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃	Outage rate <u>Score Energy Capacity</u> Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	Very High Very Iow Very Iow Very Iow	High Low Low Low	Medium Medium Medium	High High High	∑C _{ij} w j Very high Very high Very high	41 50 65	1 0.2 0.2 0.2	8.2 10 13
C ₆₄ f 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very High Very Iow Very Iow	High Low Low	Medium Medium	High High	∑C _{ij} w _j Very high Very high	41 50	1 0.2 0.2	8.2 10
C ₆₄ f 6 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very High Very Iow Very Iow Very Iow Very Iow Very Negati	High Low Low Low Negative	Medium Medium Medium Stable	High High High Positive	ΣC _{ij} w _j Very high Very high Very high Very Positive Very High	41 50 65 50	1 0.2 0.2 0.2 0.2	8.2 10 13 10
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 6	Outage rate Score Energy Copacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High Very Iow Very Iow Very Iow Very Iow Very Negati	High Low Low Low Negative	Medium Medium Medium Stable	High High High Positive	∑C _{ij} w _j Very high Very high Very high Very Positive	41 50 65 50	1 0.2 0.2 0.2 0.2	8.2 10 13 10 13
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 7 7 7 7 7 7 7	Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High Very Iow Very Iow Very Iow Very Iow Very Negati	High Low Low Low Negative	Medium Medium Medium Stable	High High High Positive High	$\frac{\sum C_{ij}w_j}{Very high}$ Very high Very high Very hogh Very Positive Very High $\sum C_{ij}w_j$	41 50 65 50	1 0.2 0.2 0.2 0.2	8.2 10 13 10 13
C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 7 7 7 7 7 7 7	Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Low Low Negative Low	Medium Medium Stable Medium	High High High Positive High High	$ΣC_{ij}w_j$ Very high Very high Very high Very Positive Very High $ΣC_{ij}w_j$ Very high	41 50 65 50 65	1 0.2 0.2 0.2 0.2 0.2 0.2 1	8.2 10 13 10 13 54.2
C ₆₄ f 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 7 7 7 7 7 7 7 7	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very High Very Iow Very Iow Very Iow Very Negati Very Iow	High Low Low Low Low Low Low Low	Medium Medium Medium Stable Medium	High High High Positive High	$\frac{\sum C_{ij}w_j}{Very high}$ Very high Very high Very hogh Very Positive Very High $\sum C_{ij}w_j$	41 50 65 50 65 65	1 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	8.2 10 13 10 13 54.2 13
C ₆₄ 7 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ 7 7 C ₇₄ 7 8 C ₈₁ C ₈₂ C ₈₃	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very High Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	High Low Low Low Low Low Low Low Low Low	Medium Medium Medium Stable Medium Intermediate Intermediate	High High High Positive High High High	$ΣC_{ij}w_j$ Very high Very high Very Positive Very High $ΣC_{ij}w_j$ Very high Very high Very high Very high	41 50 65 50 65 65	1 0.2 0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2	8.2 10 13 10 13 54.2 13 13
C ₆₄ 7 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ 7 8 C ₈₁ C ₈₂ C ₈₃ C ₈₃	Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmentol Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very High Very Iow Very Iow Very Negati Very Iow Very Iow Very Iow Very Iow Very Iow	High Low Low Low Low Low Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High High High High High High	$\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	41 50 65 50 65 65 65 65 70	1 0.2 0.2 0.2 0.2 0.2 1 0.2 0.2 0.2 0.2	8.2 10 13 10 13 54.2 13 13 13

Appendix IV.L.1: Nalgonda Mandal – Nalgonda Municipality

Appendix IV.L.2: Nalgonda Mandal – Panagal

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	55	1	55
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	55
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C23	Administrative agencies	None	State	District	Mandal	Habitational	60	0.1667	10
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₅	Governance	None	State	District	Mandal	Habitational	65	0.1667	10.83333
C26	Presence of NGOs	None	Low	Medium	High	Very High	30	0.1667	5
f_2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	54.16667
3	Human Resources Capacity (service pr	rovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	45	0.2	9
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	50	0.2	10
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			60	0.2	12
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				75	0.2	15
C35	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	62.2
4	Technical Capacity								
C_{41}	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	50	0.2	10
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	50	0.2	10
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	45	0.2	9
C45	Maintenance network	None	State	District	Mandal	Habitational	65	0.2	13
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	70	0.2	14
	1				District Approved	District Approved			
f4	Score Technical Capacity					$\sum C_{ij} w_j$		1	56
5									
C ₅₁	Private sector investment	None	State	Regional	District	Mandal	81	0.14	11.57143
C52	Market incentives	None	Low	Medium	High	Very high	50	0.14	7.142857
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	40	0.14	5.714286
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	7.142857
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	40		5.714286
								0.14	7.142857
C57		Very High	High	Medium	Low	None	50		
fs	Score Economical and Financial Capac	Very High	High			None $\sum C_{ij} w_j$		1	51.57143
f <u>s</u> 6	Score Economical and Financial Capace Energy Capacity	Very High <i>ity</i>		Medium	Low	$\sum C_{ij} w_j$	50	1	
f <u>s</u> 6 C ₆₁	Score Economical and Financial Capaci Energy Capacity Primary source	Very High <i>ity</i> None	Non-conventional	Medium Conventional electricity	Low Electricity mid-voltage	∑C _{ij} w j Electricity high voltage	50 65	1 0.25	16.25
f <u>5</u> 6 C ₆₁ C ₆₂	Score Economical and Financial Capac Energy Capacity Primary source Alternative source	Very High ity None None	Non-conventional None	Medium Conventional electricity Generator < 10 HP	Low Electricity mid-voltage Generator < 50 HP	∑C _{ij} w _j Electricity high voltage Generator > 50 HP	50 65 45	1 0.25 0.25	16.25 11.25
f <u>s</u> C ₆₁ C ₆₂ C ₆₃	Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	Very High <i>ity</i> None None Very Iow	Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	Low Electricity mid-voltage Generator < 50 HP High	ΣC _{ij} w _j Electricity high voltage Generator > 50 HP Very High	50 65 45 50	1 0.25 0.25 0.25	16.25 11.25 12.5
f <u>s</u> C ₆₁ C ₆₂ C ₆₃	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate	Very High ity None None	Non-conventional None	Medium Conventional electricity Generator < 10 HP	Low Electricity mid-voltage Generator < 50 HP	ΣC ij W j Electricity high voltage Generator > 50 HP Very High Very low	50 65 45	1 0.25 0.25	16.25 11.25 12.5 11.25
f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	Very High ity None None Very Iow Very High	Non-conventional None Low	Medium Conventional electricity Generator < 10 HP Medium	Low Electricity mid-voltage Generator < 50 HP High	ΣC _{ij} w _j Electricity high voltage Generator > 50 HP Very High	50 65 45 50	1 0.25 0.25 0.25	16.25 11.25 12.5
f ₅ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	Very High <i>ity</i> None None Very low Very High	Non-conventional None Low High	Medium Conventional electricity Generator < 10 HP Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low	$\frac{\sum C_{ij} w_j}{\text{Electricity high voltage}}$ Electricity high voltage Generator > 50 HP Very High Very High Very low $\sum C_{ij} w_j$	50 65 45 50 45	1 0.25 0.25 0.25 0.25 1	16.25 11.25 12.5 11.25 51.25
f ₃ C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁	Scare Economical and Financial Capace Energy Capadity Primary source Alternative source Dependence for service Outage rate Scare Energy Capacity Environmental and Ecological Capacity Environment quality	Very High ity None None Very Iow Very High Very Iow	Non-conventional None Low High	Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high	50 65 45 50 45 	1 0.25 0.25 0.25 0.25 1 0.25 1 0.2	16.25 11.25 12.5 11.25 51.25
f3 6 C61 C62 C63 C64 C64 C7 C71 C72	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow	Non-conventional None Low High Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{E}$ Very high Very high	50 65 45 50 45 	1 0.25 0.25 0.25 1 0.2 1 0.2 0.2	16.25 11.25 12.5 11.25 51.25 11 11
f3 6 C61 C61 C62 C63 C64 F6 7 C71 C72 C73	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics	Very High ity None None Very low Very High Very low Very low Very low	Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{Very high}$ Very high Very high	50 65 45 50 45 55 60 55	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2	16.25 11.25 12.5 11.25 51.25 11 11 12 11
f3 6 C61 C62 C63 C63 C64 F6 7 C71 C72 C73 C74 C74	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very High ity None None Very low Very High Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High	$\frac{\sum C_{ij}w_j}{E_{ij}w_j}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij}w_j}{Very high}$ Very high Very high Very Positive	50 65 45 50 45 55 60 55 60	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	16.25 11.25 12.5 11.25 51.25 11 11 12 11
f3 6 C61 C62 C63 C63 C64 F6 7 C71 C72 C73 C74 C74	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High ity None None Very low Very High Very low Very low Very low	Non-conventional None Low High Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	50 65 45 50 45 55 60 55	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2	16.25 11.25 12.5 11.25 51.25 11 12 11 12 11 12 13
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High ity None None Very low Very High Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High	$\frac{\sum C_{ij}w_j}{E_{ij}w_j}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij}w_j}{Very high}$ Very high Very high Very Positive	50 65 45 50 45 55 60 55 60	1 0.25 0.25 0.25 1 0.25 1 0.2 0.2 0.2 0.2 0.2	16.25 11.25 12.5 11.25 51.25 11 12 11 12 11 12 13
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very High ity None None Very low Very High Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	50 65 45 50 45 55 60 55 60 65	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1	16.25 11.25 12.5 11.25 51.25 51.25 111 12 111 12 111 59
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ f ₆ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very High ity None None Very low Very High Very low Very low Very low Very Negati	Non-conventional None Low High Low Low Low Low Negative	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Low Electricity mid-voltage Generator < 50 HP High Low High High High High	$\frac{\sum C_{ij} w_j}{Electricity high voltage}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High	50 65 45 50 45 55 60 55 60 65 60 65 65	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	16.25 11.25 12.5 11.25 51.25 51.25 11 12 11 12 11 12 13 59 13
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ 7 C ₇₁ C ₇₁ C ₇₄ C ₇₄ C ₇₄ C ₈₁	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow Very Iow Very Iow	Non-conventional None Low High Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High	$\frac{\sum C_{ij} w_j}{}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{}$ Very high Very high Very high Very High Very High $\frac{\sum C_{ij} w_j}{}$	50 65 45 50 45 55 60 55 60 65	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1	16.25 11.25 12.5 11.25 5
fs 6 C61 C62 C63 C64 C64 f6 7 C71 C71 C72 C73 C74 C74 f7 8 C81 C82 C82	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very High ity None None Very low Very High Very low Very low Very low Very low Very low Very low	Non-conventional None Low High Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High High High Positive High	$\frac{\sum C_{ij} w_j}{}$ Electricity high voltage Generator > 50 HP Very High Very low $\frac{\sum C_{ij} w_j}{}$ Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high	50 65 45 50 45 55 60 55 60 65 60 65 65	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	16.25 11.25 12.5 11.25 51.25 51.25 11 12 11 12 11 12 13 59 13
fs 6 C61 C62 C63 C63 C64 f f6 7 C71 C73 C74 f7 f7 8 C81 C82	Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Scola and Cultural Capacity Communal ownership Political stability	Very High ity None Very low Very low Very low Very low Very low Very low Very low Very low Very low Very low	Non-conventional None Low High Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very High Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high Very high	50 65 45 50 45 55 60 55 60 65 60 65 70	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	16.25 11.25 12.5 11.25 5
fs 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ C ₆₄ 7 C ₇₁ C ₇₃ C ₇₄ F S C ₈₁ C ₈₂ C ₈₃ C ₈₄ C ₈₄	Score Economical and Financial Capace Energy Capacity Primary source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cuttural Capacity Communal ownership Political stability	Very High /// None Very Iow Very High Very Iow Very Iow	Non-conventional None Low High Low Low Low Low Low Low Low Low Low Low	Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Stable Intermediate Intermediate Intermediate	Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	$\frac{\sum C_{ij} w_j}{E}$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high Very high	50 65 45 50 45 55 60 55 60 65 60 65 70 70 70	1 0.25 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	16.25 11.25 11.25 51.25

Appendix IV.M.1:	P. A. Pally Mandal –	Chilkamarry

				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	30	1	30
fı	Score Service Capacity					$\sum C_{ij} w_j$		1	30
2	Institutional Capacity								
C_{21}	Body of legislation	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
C_{22}	Operational rules	None	Basic	Intermediate	Complete	Advanced	35	0.1667	5.833333
C23	Administrative agencies	None	State	District	Mandal	Habitational	40	0.1667	6.666667
C_{24}	Administrative processes	None	Basic	Intermediate	Complete	Advanced	35	0.1667	5.833333
C ₂₅	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C_{26}	Presence of NGOs	None	Low	Medium	High	Very High	21	0.1667	3.5
f ₂	Score Institutional Capacity					$\sum C_{ij} w_j$		1	38.66667
3	Human Resources Capacity (service pr	ovider)							
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	35	0.2	7
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	35	0.2	7
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			50	0.2	10
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				60	0.2	12
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
fз	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	48.2
4	Technical Capacity								
C_{41}	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	40	0.2	8
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	40	0.2	8
C45	Maintenance network	None	State	District	Mandal	Habitational	55	0.2	11
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	60	0.2	12
					District Approved	District Approved			
fa	Score Technical Capacity					$\sum C_{ij} w_j$		1	47
5	Economical and Financial Capacity					_ , ,			
C_{51}	Private sector investment	None	State	Regional	District	Mandal	61	0.14	8.714286
C52	Market incentives	None	Low	Medium	High	Very high	40	0.14	5.714286
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	21	0.14	3
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	30	0.14	4.285714
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	40	0.14	5.714286
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
C56	Investment activities	None	Low	Medium	High	Very High	40	0.14	5.714286
		Very High		Medium	Low	None	40		5.714286
fs	Score Economical and Financial Capaci					$\sum C_{ij} w_j$		1	38.85714
6	Energy Capacity								
C ₆₁	Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	60	0.25	15
C ₆₂	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	50	0.25	12.5
C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	40	0.25	10
C ₆₄	Outage rate	Very High	High	Medium	Low	Very low	41	0.25	10.25
f6	Score Energy Capacity					$\sum C_{ij} w_j$		1	47.75
7	Environmental and Ecological Capacity								
C ₇₁	Environment quality	Very low	Low	Medium	High	Very high	45	0.2	9
C ₇₂	Size of resource system	Very low	Low	Medium	High	Very high	45	0.2	9
C ₇₃	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	45	0.2	9
C ₇₄	Growth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	60	0.2	12
C ₇₄	Resource sensibility	Very low	Low	Medium	High	Very High	50	0.2	10
-74 fz	Score Environmental Capacity	,				$\sum C_{ij} w_{j}$		1	49
8	Social and Cultural Capacity		L			2+ J'' J		-	-+5
-	Communal ownership	Very low	Low	Intermediate	High	Very high	40	0.2	8
C ₈₁			Low	Intermediate			35	0.2	° 7
C ₈₂	Political stability	Very low			High	Very high	40		8
C ₈₃	Equity	Very low	Low	Intermediate	High	Very high		0.2	
	Leadership/entrepreneurship	Very low	Low	Intermediate	High	Very high	50	0.2	10
C ₈₄	o								
C ₈₄ C ₈₅	Participation of women Score Social-Cultural Capacity	Very low	Low	Intermediate	High	Very high $\sum C_{ij} w_i$	35	0.2	40

ſ				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	61	1	61
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	61
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	60	0.1667	10
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	55	0.1667	9.166667
	Administrative processes	None	Basic	Intermediate	Complete	Advanced	50	0.1667	8.333333
2.5	Governance	None	State	District	Mandal	Habitational	81	0.1667	13.5
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	45	0.1667	7.5
f2 -	Score Institutional Capacity					$\sum C_{ij} w_j$		1	56.83333
-	Human Resources Capacity (service p								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	60	0.2	12
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
<u> </u>		Neze	Marshawia			Public relations manager	60	0.2	12
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	60	0.2	12
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator Health Inspector			
					Health Inspector Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
Caa	Unskilled Labor	Craftsman	Clerk	Clerk			80	0.2	16
C ₃₃		cranomali	Mechanic assistant	Water meter reader				0.2	10
			incentance assistance	Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker	water systems worker			80	0.2	16
	Access to Higher Education	None	State	Regional	District	Mandal	81	0.2	16.2
635 f 3	Score Human Resources Capacity	Home	State	negronar	bistitet	$\sum C_{ij} w_j$	01	1	72.2
4	Technical Capacity					2-= ij ··· j			
_	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	65	0.2	13
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C42	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	55	0.2	11
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C43	Adaptation	None	Rarely	Occasionally	Usually	Frequently	55	0.2	11
C45	Maintenance network	None	State	District	Mandal	Habitational	70	0.2	14
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	81	0.2	16.2
					District Approved	District Approved			
fa .	Score Technical Capacity					$\sum C_{ij} w_j$		1	65.2
_	Economical and Financial Capacity								
_	Private sector investment	None	State	Regional	District	Mandal	75	0.14	10.71429
-	Market incentives	None	Low	Medium	High	Very high	40	0.14	5.714286
	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	50	0.14	7.142857
	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	50	0.14	7.142857
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	50	0.14	7.142857
				Equipment	Equipment	Equipment			
~					Cash	Cash - Stocks	l .		7
	Investment activities	None	Low	Medium	High	Very High	50		7.142857
C57		Very High	High	Medium	Low	None	60	0.14	
5	Score Economical and Financial Capac Energy Capacity	ny l				$\sum C_{ij} w_j$		1	53.57143
-	Energy Capacity Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	70	0.25	17.5
	Primary source Alternative source	None		Generator < 10 HP	Generator < 50 HP		45	0.25	17.5
	Alternative source Dependence for service	None Very low	None Low	Generator < 10 HP Medium	Generator < 50 HP High	Generator > 50 HP Very High	45	0.25	11.25
	Outage rate	Very Tow Very High	High	Medium	Low	Very low	41	0.25	10.25
						,	- +1		52.75
C64		very mgn	riigii	incaram		$\Sigma C_{ii} W_{i}$		1	32.73
f6	Score Energy Capacity		riigii			$\sum C_{ij} w_j$		1	
f <u>6</u> 7	Score Energy Capacity Environmental and Ecological Capacity	(High		65	_	13
f ₆ 7 C ₇₁	Score Energy Capacity Environmental and Ecological Capacity Environment quality		Low	Medium Medium	High High	Very high	65	0.2	13 13
f 6 7 С71 С72	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	/ Very low	Low	Medium	High High High	Very high Very high		0.2	
f ₆ 7 C ₇₁ C ₇₂ C ₇₃	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	Very low Very low	Low Low Low	Medium Medium	High	Very high Very high Very high	65	0.2	13
f6 7 C71 C72 C72 C73 C74 C74	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	Very low Very low Very low	Low Low Low	Medium Medium Medium	High High	Very high Very high	65 60	0.2	13 12
f6 7 C71 C72 C72 C73 C74 C74	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	Very Iow Very Iow Very Iow Very Negati	Low Low Low Low Negative	Medium Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive Very High	65 60 55	0.2 0.2 0.2 0.2	13 12 11
f6 7 C71 C72 C73 C73 C74 C74 C74 C74	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	Very Iow Very Iow Very Iow Very Negati	Low Low Low Low Negative	Medium Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive	65 60 55	0.2 0.2 0.2 0.2	13 12 11 12
f6 7 C71 C72 C73 C74 C74 f7 8	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	Very Iow Very Iow Very Iow Very Negati	Low Low Low Low Negative	Medium Medium Medium Stable	High High Positive	Very high Very high Very high Very Positive Very High	65 60 55	0.2 0.2 0.2 0.2	13 12 11 12 61
f6 7 C71 C72 C73 C74 C74 C74 f7 8 C81 C81	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	Very low Very low Very low Very Negati Very low	Low Low Low Negative Low	Medium Medium Medium Stable Medium	High High Positive High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$	65 60 55 60	0.2 0.2 0.2 0.2 0.2 0.2 1	13 12 11 12 61 13
f6 7 C71 C72 C73 C74 F7 8 C81 C82	Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership	Very low Very low Very low Very Negati Very low	Low Low Low Low Low Low Low	Medium Medium Medium Stable Medium Intermediate	High High Positive High High High	Very high Very high Very high Very hositive Very High $\sum C_{ij} w_j$ Very high	65 60 55 60 65	0.2 0.2 0.2 0.2 0.2 0.2 1 0.2	13 12 11 12 61 13 13
f6 7 C71 C72 C73 C74 C74 C74 f7 B C81 C82 C83 C83	Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	Very low Very low Very low Very Negati Very low Very low Very low	Low Low Low Low Low Low Low Low	Medium Medium Medium Stable Medium Intermediate Intermediate	High High Positive High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	65 60 55 60 60 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2	13 12 11 12 61 13 13 13 13
f6 7 C71 C72 C72 C73 C74 C74 C81 C74 C82 C783 C783 C784	Score Energy Capacity Environment quality Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	Very low Very low Very low Very low Very low Very low Very low Very low	Low Low Negative Low Low Low Low Low	Medium Medium Stable Medium Intermediate Intermediate Intermediate	High High Positive High High High High	Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high Very high	65 60 55 60 60 65 65 65	0.2 0.2 0.2 0.2 1 0.2 1 0.2 0.2 0.2 0.2	13 12 11 12

Appendix IV.N.1: Narayanpur Mandal – Vaillapally

_				Partitio	ned Scoring				
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
C11	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 I/p/d	> 80 l/p/d	50	1	50
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	50
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C22	Operational rules	None	Basic	Intermediate	Complete	Advanced	65	0.1667	10.83333
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	70	0.1667	11.66667
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	70	0.1667	11.66667
	Governance	None	State	District	Mandal	Habitational	85	0.1667	14.16667
C26	Presence of NGOs	None	Low	Medium	High	Very High	40	0.1667	6.666667
f2	Score Institutional Capacity					$\sum C_{ij} w_j$		1	65.83333
	Human Resources Capacity (service p								
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	80	0.2	16
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	80	0.2	16
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			95	0.2	19
			Mechanic assistant	Water meter reader					
				Water systems worker					
- 54	Illiterate	Caretaker	Caretaker				95	0.2	19
C35	Access to Higher Education	None	State	Regional	District	Mandal	90	0.2	18
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	88
	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	85	0.2	17
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	70	0.2	14
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
~						Maintain IT systems			40
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	65	0.2	13
	Maintenance network	None	State	District	Mandal	Habitational	75	0.2	15
C45	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	75	0.2	15
					District Approved	District Approved			
ta _	Score Technical Capacity					$\sum C_{ij} w_j$		1	74
	Economical and Financial Capacity	News	Chanta	Designal	District	Manual at	0.1	0.14	11 57142
C ₅₁	Private sector investment Market incentives	None None	State Low	Regional Medium	District	Mandal	81 70	0.14	11.57143 10
					High	Very high	70	0.14	
	User fees	None None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate		0.14	7 0571/12
C54 C55	Budget	NUTE	Basic accounting		Tracked bi-annually	Tracked quarterly	55	0.14	7.857143
		None	Real Estate	Annual Real estate	Tracked bi-annually Real estate	Tracked quarterly Real estate	60	0.14	8.571429
~->>	Asset values	None	Real Estate	Real estate	Real estate	Real estate			
~	Asset values	None	Real Estate		Real estate Equipment	Real estate Equipment	60	0.14	8.571429
				Real estate Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks	60 70	0.14	8.571429 10
C56	Investment activities	None	Low	Real estate Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High	60 70 65	0.14 0.14 0.14	8.571429 10 9.285714
C56	Investment activities Loss to corruption	None Very High	Low	Real estate Equipment	Real estate Equipment Cash	Real estate Equipment Cash - Stocks Very High None	60 70	0.14 0.14 0.14	8.571429 10 9.285714 8.714286
C ₅₆ C ₅₇ f ₅	Investment activities Loss to corruption Score Economical and Financial Capac	None Very High	Low	Real estate Equipment Medium	Real estate Equipment Cash High	Real estate Equipment Cash - Stocks Very High	60 70 65	0.14 0.14 0.14	8.571429 10 9.285714
C ₅₆ C ₅₇ f ₅ 6	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity	None Very High <i>ity</i>	Low High	Real estate Equipment Medium Medium	Real estate Equipment Cash High Low	Real estate Equipment Cash - Stocks Very High None ΣC _{ij} w _j	60 70 65 61	0.14 0.14 0.14 0.14 1	8.571429 10 9.285714 8.714286 66
C ₅₆ C ₅₇ f ₅ 6 C ₆₁	Investment activities Loss to corruption Score Economical and Financial Capac Bergy Capacity Primary source	None Very High ity None	Low High Non-conventional	Real estate Equipment Medium Medium Conventional electricity	Real estate Equipment Cash High Low Electricity mid-voltage	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage	60 70 65 61 81	0.14 0.14 0.14 0.14 1 0.25	8.571429 10 9.285714 8.714286 66 20.25
C ₅₆ C ₅₇ f ₅ 6 C ₆₁ C ₆₂	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source	None Very High ity None None	Low High Non-conventional None	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP	60 70 65 61 81 70	0.14 0.14 0.14 0.14 1 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5
C_{56} C_{57} f_5 G_{61} C_{62} C_{63}	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service	None Very High <i>ity</i> None None Very Iow	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	60 70 65 61 81 70 75	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75
C ₅₆ C ₅₇ f ₅ C ₆₁ C ₆₂ C ₆₃	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	None Very High ity None None	Low High Non-conventional None	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low	60 70 65 61 81 70	0.14 0.14 0.14 0.14 1 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 18.75 11.25
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	60 70 65 61 81 70 75	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 7	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	None Very High <i>ity</i> None None Very Iow Very High	Low High Non-conventional None Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very I low $\sum C_{ij} w_j$	60 70 65 61 81 70 75 45	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 18.75 11.25
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71}	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None Very High <i>ity</i> None None Very Iow Very High Very High	Low High Non-conventional None Low High	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high	60 70 65 61 81 70 75 45 55	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 11.21
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₁ C ₇₂	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity	None Very High ity None None Very low Very High Very High Very How Very low	Low High Non-conventional None Low High Low Low High Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\Sigma C_{ij} w_j$ Very high Very high	60 70 65 61 81 70 75 45	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_6 T C_{71} C_{72} C_{73}	Investment activities Loss to corruption Score Economical and Financiol Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality Size of resource system	None Very High ity None None Very low Very High Very High Very How Very low Very low Very low	Low High Non-conventional None Low High Low Low Low	Real estate Equipment Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high	60 70 65 61 81 70 75 45 55 55 50 45	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 11.25 67.75
C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} C_{71} C_{72} C_{73} C_{74}	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics	None Very High ity None None Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very Positive	60 70 65 61 81 70 75 45 45 55 55 50	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 111 11
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None Very High ity None None Very low Very High Very High Very How Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Negative	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very Positive Very High	60 70 65 61 81 70 75 45 55 50 45 55	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	8.571429 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67 11 10 9 9 11 13
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₆₄ C ₆₄ C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None Very High ity None None Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Negative	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very Positive	60 70 65 61 81 70 75 45 55 50 45 55	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 70.25 17.55 18.75 11.25 67.75 11.25 67.75 11.00 9 11
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₆₄ 7 C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ C ₇₄ 8	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Score Invironmental Capacity Scorel and Cultural Capacity	None Very High None Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very low $\Sigma C_{ij} w_j$ Very high Very high Very high Very High Very High $\Sigma C_{ij} w_j$	60 70 65 61 81 70 75 45 55 50 45 55 50 45	0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 67.75 111 11 10 9 9 111 13 54
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₂ C ₆₃ C ₆₄ 7 C ₇₄ C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ 8 C ₈₁	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Scola and Cultural Capacity Communal ownership	None Very High ity None Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Intermediate	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	60 70 65 61 70 75 45 55 50 45 55 50 45 55 50 45 55 50 45	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 7.75 11.25 67.75 11.25 67.75 11.2
C ₅₆ C ₅₇ 6 C ₆₁ C ₆₃ C ₆₄ 7 C ₆₄ 7 C ₇₄ C ₇₄ C ₇₄ 7 C ₇₄ 8 C ₈₁ C ₈₂	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None Very High ity None Very low Very low Very High Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Stable Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very High Very High $\Sigma C_{ij} w_j$ Very High Very High Very High Very High Very High Very High Very High Very High Very High Very high	60 70 65 61 81 70 75 45 55 50 45 55 55 55 55 55 60 45 55 55 55	0.14 0.14 0.14 1 0.25 0.25 0.25 1 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	8.571429 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 11.2
C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} T C_{71} C_{72} C_{73} C_{74} f_{7} f_{7} R_{7	Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None Very High ity None Very low Very High Very Iow Very low Very low Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Medium Intermediate Intermediate	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very High Very High $\sum C_{ij} w_j$ Very High Very high	60 70 65 81 70 75 45 55 50 45 55 50 45 55 50 45 55 65 75	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.25 67.75 11.2
C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} T C_{71} C_{72} C_{73} C_{74} C_{74} f_{7} C_{74} C_{74} C_{81} C_{82} C_{83} C_{84}	Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment al and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability	None Very High ity None Very low Very low Very High Very low Very low Very low Very low Very low Very low Very low	Low High Non-conventional None Low High Low Low Low Low Low Low Low Low Low	Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable Medium Stable Medium Stable Medium	Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High High High High High	Real estate Equipment Cash - Stocks Very High None $\Sigma C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very High Very High $\Sigma C_{ij} w_j$ Very High Very High Very High Very High Very High Very High Very High Very High Very High Very high	60 70 65 61 81 70 75 45 55 50 45 55 55 55 55 55 60 45 55 55 55	0.14 0.14 0.14 1 0.25 0.25 0.25 1 0.25 1 0.25 0.25 1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	8.571429 10 9.285714 8.714286 66 20.25 17.5 18.75 11.25 67.75 67.75 111 11 10 9 9 111 13 54

Appendix IV.O.1: Suryapet Mandal – Suryapet Municipality

				Dortitio	nod Scoring				
	Capacity Factors	1-20	21-40	41-60	ned Scoring 61-80	81-100	Score	Weight	CF score
1	Service Capacity	1-20	21.40	41-00	01-00	01-100	JUIC	weight	CI SCOTC
	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	20	1	20
fi	Score Service Capacity					$\sum C_{ij} w_j$		1	20
2	Institutional Capacity								
C21	Body of legislation	None	Basic	Intermediate	Complete	Advanced	40	0.1667	6.666667
C222	Operational rules	None	Basic	Intermediate	Complete	Advanced	35	0.1667	5.833333
C23	Administrative agencies	None	State	District	Mandal	Habitational	45	0.1667	7.5
C24	Administrative processes	None	Basic	Intermediate	Complete	Advanced	35	0.1667	5.833333
C ₂₅	Governance	None	State	District	Mandal	Habitational	61	0.1667	10.16667
C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	45	0.1667	7.5
f ₂	Score Institutional Capacity					$\sum C_{ij} w_j$		1	43.5
3	Human Resources Capacity (service pr	1							
C ₃₁	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	41	0.2	8.2
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
Ċ	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Public relations manager Maintenance technician	35	0.2	7
-32		NUTE	Weename	Laboratory technician	Laboratory technician	Laboratory technician		0.2	
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C33	Unskilled Labor	Craftsman	Clerk	Clerk			60	0.2	12
			Mechanic assistant	Water meter reader					
				Water systems worker					
C34	Illiterate	Caretaker	Caretaker				60	0.2	12
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
f3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	51.4
4	Technical Capacity								
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
				Control Water Quality	Control Water Quality	Control Water Quality			
					Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	25	0.2	5
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
C43	Adaptation	None	Rarely	Occasionally	Usually	Maintain IT systems Frequently	35	0.2	7
C_{43} C_{45}	Maintenance network	None	State	District	Mandal	Habitational	55	0.2	11
	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier	55	0.2	11
-45					District Approved	District Approved			
fa	Score Technical Capacity					$\sum C_{ij} w_j$		1	42
5	Economical and Financial Capacity								
C51	Private sector investment	None	State	Regional	District	Mandal	50	0.14	7.142857
C52	Market incentives	None	Low	Medium	High	Very high	35	0.14	5
C53	User fees	None	Uniform flat rate	Single block rate	Increasing block rate	Increasing block rate	21	0.14	3
C54	Budget	None	Basic accounting	Annual	Tracked bi-annually	Tracked quarterly	30	0.14	4.285714
C55	Asset values	None	Real Estate	Real estate	Real estate	Real estate	41	0.14	5.857143
				Equipment	Equipment	Equipment			
					Cash	Cash - Stocks			
	Investment activities	None	Low	Medium	High	Very High	30		4.285714
C57		Very High	High	Medium	Low	None	35	0.14	24 574 42
15	Score Economical and Financial Capaci Energy Capacity	ny l				$\sum C_{ij} w_j$		1	34.57143
	Energy Capacity Primary source	None	Non-conventional	Conventional electricity	Electricity mid-voltage	Electricity high voltage	55	0.25	13.75
	Alternative source	None	None	Generator < 10 HP	Generator < 50 HP	Generator > 50 HP	40	0.25	15.75
C ₆₂ C ₆₃	Dependence for service	Very low	Low	Medium	High	Very High	40 55	0.25	13.75
C_{63} C_{64}	Outage rate	Very High	High	Medium	Low	Very low	25	0.25	6.25
-04 f6	Score Energy Capacity	.,				$\sum C_{ij} w_j$		1	43.75
7	Environmental and Ecological Capacity	1							
C71	Environment quality	Very low	Low	Medium	High	Very high	70	0.2	14
C ₇₂	Size of resource system	Very low	Low	Medium	High	Very high	95	0.2	19
C ₇₃	Predictability of resource dynamics	Very low	Low	Medium	High	Very high	65	0.2	13
C74	Growth or replacement rate	Very Negati	Negative	Stable	Positive	Very Positive	80	0.2	16
C74	Resource sensibility	Very low	Low	Medium	High	Very High	25	0.2	5
f7	Score Environmental Capacity					$\sum C_{ij} w_j$		1	67
	Social and Cultural Capacity								
C_{81}	Communal ownership	Very low	Low	Intermediate	High	Very high	40	0.2	8
	Political stability	Very low	Low	Intermediate	High	Very high	35	0.2	7
C ₈₂	e			Intermediate	High	Very high	20	0.2	4
C ₈₂ C ₈₃	Equity	Very low	Low						~
C ₈₂ C ₈₃ C ₈₄	Leadership/entrepreneurship	Very low	Low	Intermediate	High	Very high	40	0.2	8
C ₈₂ C ₈₃	Leadership/entrepreneurship								

Appendix IV.P.1: Chandempet Mandal – Neradugommu

г				D-state	and Constant		1		
	Capacity Factors	1-20	21-40	Partitio 41-60	ned Scoring 61-80	81-100	Score	Woisht	CF score
	Capacity Factors Service Capacity	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
-		· 20 /- /-	20 - 40 l/p/d	40 601/2/1	C0_001/-/-		45		11
C ₁₁	Effective service level	< 20 l/p/d	20 - 40 I/p/d	40 - 60 l/p/d	60 - 80 l/p/d	>80 l/p/d	15	1	19
	Score Service Capacity Institutional Capacity					$\sum C_{ij} w_j$	-	1	1;
-		Nana	Pasia	Intermediate	Complete	Advanced	50	0 1667	0 222222
	, ,	None None	Basic Basic		Complete	Advanced Advanced	50 50	0.1667	
				Intermediate	Complete				
C ₂₃	•	None None	State Basic	District	Mandal Complete	Habitational	41	0.1667	
		None	State	Intermediate District	Mandal	Advanced Habitational	61	0.1667	
C ₂₆	Score Institutional Capacity	None	Low	Medium	High	Very High	50	0.1667	47.83333
2		ouidor)				$\sum C_{ij} w_j$		1	47.03333
-	Human Resources Capacity (service pr Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	41	0.2	8.2
C ₃₁	Professionars	None	None	Health Scientist	Health Scientist	Health Scientist	41	0.2	0.2
				riearui scienusc	Engineer				
					Engineer	Engineer Lawyer			
c	Chilled Labor	None	Machania	Maintenance technician	Maintonanaa tashaisian	Public relations manager	30	0.2	. 6
C32	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	50	0.2	
				Laboratory technician	Laboratory technician	Laboratory technician			
				Water systems operator	Water systems operator	Water systems operator			
					Health Inspector	Health Inspector			1
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			1
C	Unskilled Labor	Craftsman	Clerk	Clerk		IT technician	50	0.2	10
C ₃₃	Unskilled Labor	Craftsman					50	0.2	10
			Mechanic assistant	Water meter reader					
0			I	Water systems worker					
	Illiterate	Caretaker	Caretaker				50	0.2	10
C35		None	State	Regional	District	Mandal	61	0.2	12.2 46.4
13	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	40.4
-	Technical Capacity Operations	Water Lice	Dumping Water	Dumping Water	Monitor water systems	Monitor water systems	40	0.2	8
C ₄₁	Operations	Water Use	Pumping Water	Pumping Water	Monitor water systems Control Water Quality	Monitor water systems	40	0.2	
				Control Water Quality		Control Water Quality			
					Control Pipes	Monitor pipes network			
0			a			Monitor Treatment	20		
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	30	0.2	6
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
C		News	De este	O	Usually.	Maintain IT systems	15	0.2	
		None	Rarely	Occasionally District	Usually	Frequently	65	0.2	13
		None None	State		Mandal Mandal Supplier	Habitational	50	0.2	
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier	Habitational Supplier District Approved	50	0.2	10
c	Seare Taskaisal Canasity				District Approved			1	40
T4 -	Score Technical Capacity Economical and Financial Capacity					$\sum C_{ij} w_j$	-	1	40
		Nana	State	Degional	District	Mandal	45	0.14	6 439571
		None None	State Low	Regional Medium	District High	Mandal Very high	45 40	0.14	
		None None	Low Uniform flat rate		-		40 30	0.14	
		None None		Single block rate	Increasing block rate Tracked bi-annually	Increasing block rate Tracked quarterly	30	0.14	
	•	None	Basic accounting Real Estate	Annual Real estate	Real estate	Real estate	30 45	0.14	
~55		NUTE	near Estate				45	0.14	0.42037
				Equipment	Equipment Cash	Equipment Cash - Stocks	-		
C.	Investment activition	None	Low	Medium	High	Very High	30	0.1.4	4.285714
				Medium	•	Very High None			
-57 f.	Loss to corruption Score Economical and Financial Capaci	Very High	riigh	wedfulli	Low	None $\sum C_{ij} W_j$	25	0.14	3.5/1429
6		4				∠⊂ıjwj		1	5
	Energy Capacity	None	Non-conventional	Conventional electricit	Electricity mid voltage	Electricity high voltage	60	0.25	15
				Conventional electricity	Electricity mid-voltage		40		
		None Very low	None Low	Generator < 10 HP Medium	Generator < 50 HP	Generator > 50 HP Very High	40 60	0.25	
			Low High	Medium	High Low	Very High Very low	40	0.25	
C ₆₄		Very High	1.1.611	medium	1011		40	0.25	50
7	Score Energy Capacity Environmental and Ecological Capacity					$\sum C_{ij} w_j$		1	50
			low	Modium	High	Vory high	65	0.2	13
		Very low Very low	Low Low	Medium Medium	High High	Very high Very high	85	0.2	
		Very low	Low	Medium	High High	Very high	55	0.2	
				Stable			65	0.2	
		Very Negati			Positive	Very Positive	40		
C ₇₄		Very low	Low	Medium	High	Very High	40		
17	Score Environmental Capacity					$\sum C_{ij} w_j$	-	1	62
-	Social and Cultural Capacity	Manuel	1	Internet at a second	UK-sh	Manukiak			
C_{81}	Communal ownership	Very low	Low	Intermediate	High	Very high	50		
	Political stability	Very low	Low	Intermediate	High	Very high	40	0.2	-
C ₈₂		Very low	Low	Intermediate	High	Very high	20	0.2	
C ₈₂ C ₈₃									
C ₈₂ C ₈₃ C ₈₄	Leadership/entrepreneurship	Very low	Low	Intermediate	High	Very high	40		
C ₈₂ C ₈₃ C ₈₄	Leadership/entrepreneurship		Low Low	Intermediate Intermediate	High High	Very high Very high ∑C _{ij} w _i	40 40	0.2	

Appendix IV.P.2: Chandempet Mandal – Polepally

Partitioned Scoring									
	Capacity Factors	1-20	21-40	41-60	61-80	81-100	Score	Weight	CF score
1	Service Capacity								
	Effective service level	< 20 l/p/d	20 - 40 l/p/d	40 - 60 l/p/d	60 - 80 l/p/d	> 80 l/p/d	27	1	27
f_1	Score Service Capacity					$\sum C_{ij} w_j$		1	27
2	Institutional Capacity								
	Body of legislation	None	Basic	Intermediate	Complete	Advanced	30	0.1667	5
	Operational rules	None	Basic	Intermediate	Complete	Advanced	30	0.1667	5
C ₂₃	Administrative agencies	None	State	District	Mandal	Habitational	20	0.1667	3.333333
C ₂₄ C ₂₅	Administrative processes Governance	None None	Basic State	Intermediate District	Complete Mandal	Advanced Habitational	20 61	0.1667	3.3333333
C ₂₅ C ₂₆	Presence of NGOs	None	Low	Medium	High	Very High	65	0.1667	10.83333
f_2	Score Institutional Capacity	None	LOW	Medium	1.1.611	$\sum C_{ij} w_{j}$	05	1	37.66667
3	Human Resources Capacity (service p	rovider)				2-1-1			
C31	Professionals	None	None	Administrative supervisor	Administrative manager	Administrative manager	20	0.2	4
				Health Scientist	Health Scientist	Health Scientist			
					Engineer	Engineer			
						Lawyer			
~						Public relations manager			
C ₃₂	Skilled Labor	None	Mechanic	Maintenance technician	Maintenance technician	Maintenance technician	40	0.2	8
				Laboratory technician Water systems operator	Laboratory technician Water systems operator	Laboratory technician Water systems operator			
				stater systems operator	Health Inspector	Health Inspector			
					Administratrive assistant	Administratrive assistant			
					Water meter leader	Water meter leader			
						IT technician			
C ₃₃	Unskilled Labor	Craftsman	Clerk	Clerk			35	0.2	7
			Mechanic assistant	Water meter reader					
				Water systems worker					
C ₃₄	Illiterate	Caretaker	Caretaker				60	0.2	12
C35	Access to Higher Education	None	State	Regional	District	Mandal	61	0.2	12.2
<u>f</u> 3	Score Human Resources Capacity					$\sum C_{ij} w_j$		1	43.2
	Technical Capacity Operations	Water Lice	Pumping Water	Pumping Water	Monitor water systems	Monitor water systems	40	0.2	8
C41	operations	water use	rumping water	Control Water Quality	Control Water Quality	Control Water Quality	40	0.2	0
				,	Control Pipes	Monitor pipes network			
						Monitor Treatment			
C ₄₂	Maintenance	None	Clean water systems	Check water systems	Check/maintain water systems	Check/maintain water systems	20	0.2	4
			Minor repair	Major repair	Major repair	Check/maintain network			
					Maintain pipes	Check/maintain meter			
						Maintain IT systems			
C ₄₃	Adaptation	None	Rarely	Occasionally	Usually	Frequently	35	0.2	7
C45	Maintenance network	None	State	District	Mandal	Habitational	65 61	0.2	13
C ₄₅	Distribution network	None	Regional Supplier	District Supplier	Mandal Supplier District Approved	Habitational Supplier District Approved	61	0.2	12.2
f.	Score Technical Capacity				District Approved	$\sum C_{ij} w_i$		1	44.2
5	Economical and Financial Capacity		-			<u>Z</u> e 11 w j		-	
C ₅₁	Private sector investment	None	State	Regional	District	Mandal		0.14	5.857143
	Market incentives	None	Low	Medium	High		41		3.571429
	User fees	None				Very high	41 25	0.14	3.5/1429
C54	Dudeet	NOTE	Uniform flat rate	Single block rate	Increasing block rate	Very high Increasing block rate		0.14	3.571429
	Budget	None	Basic accounting	Single block rate Annual	-	Increasing block rate Tracked quarterly	25 21 21	0.14 0.14	3
C55	Budget Asset values			Annual Real estate	Increasing block rate Tracked bi-annually Real estate	Increasing block rate Tracked quarterly Real estate	25 21	0.14	3.371429 3 3 5.857143
C55	-	None	Basic accounting	Annual	Increasing block rate Tracked bi-annually Real estate Equipment	Increasing block rate Tracked quarterly Real estate Equipment	25 21 21	0.14 0.14	3
	Asset values	None None	Basic accounting Real Estate	Annual Real estate Equipment	Increasing block rate Tracked bi-annually Real estate Equipment Cash	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks	25 21 21 41	0.14 0.14 0.14	3 3 5.857143
C ₅₆	Asset values	None None None	Basic accounting Real Estate Low	Annual Real estate Equipment Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High	25 21 21 41 21	0.14 0.14 0.14 0.14	3 3 5.857143 3
C ₅₆	Asset values Investment activities Loss to corruption	None None None Very High	Basic accounting Real Estate Low	Annual Real estate Equipment	Increasing block rate Tracked bi-annually Real estate Equipment Cash	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None	25 21 21 41	0.14 0.14 0.14 0.14	3 3 5.857143 3 5.714286
C ₅₆ C ₅₇	Asset values	None None None Very High	Basic accounting Real Estate Low	Annual Real estate Equipment Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High	25 21 21 41 21	0.14 0.14 0.14 0.14	3 3 5.857143 3
C ₅₆ C ₅₇ f ₅ 6 C ₆₁	Asset values Investment activities Loss to corruption Score Economical and Financial Capac	None None None Very High	Basic accounting Real Estate Low	Annual Real estate Equipment Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None	25 21 21 41 21	0.14 0.14 0.14 0.14	3 3 5.857143 3 5.714286
C_{56} C_{57} f_5 G_{61} C_{62}	Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity	None None None Very High <i>ity</i>	Basic accounting Real Estate Low High	Annual Real estate Equipment Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None ΣC i _j w _j	25 21 21 41 21 40	0.14 0.14 0.14 0.14 0.14 1	3 5.857143 3 5.714286 30
C ₅₆ C ₅₇ f ₅ 6 C ₆₁ C ₆₂ C ₆₃	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service	None None Very High <i>ity</i> None None Very Iow	Basic accounting Real Estate Low High Non-conventional None Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	25 21 41 21 40 40 45 30 45	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25
C ₅₆ C ₅₇ f ₅ 6 C ₆₁ C ₆₂ C ₆₃	Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate	None None Very High <i>ity</i> None None	Basic accounting Real Estate Low High Non-conventional None	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow	25 21 21 41 21 40 21 40 40 45 30	0.14 0.14 0.14 0.14 1 0.25 0.25	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25 8.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6	Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity	None None Very High ity None None Very Iow Very High	Basic accounting Real Estate Low High Non-conventional None Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High	25 21 41 21 40 40 45 30 45	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{63} C_{64} f_6 7	Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacit	None None Very High ity None None Very Iow Very High	Basic accounting Real Estate Low High Non-conventional None Low High	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$	25 21 21 41 21 40 40 40 45 30 45 35	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 1	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25 8.75 38.75
C_{56} C_{57} f_{5} C_{61} C_{62} C_{63} C_{64} f_{6} f_{6} T C_{71}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Environment quality	None None Very High <i>ity</i> None None Very Iow Very High	Basic accounting Real Estate Low High Non-conventional None Low High Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very Iow $\sum C_{ij} w_j$ Very high	25 21 41 21 40 21 40 40 45 30 45 35 65	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25 7.5 11.25 8.75 38.75 38.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 f_6 7 C_{71} C_{72}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Size of resource system	None None Very High Very How Very How Very High Very High	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high	25 21 21 41 21 40 40 45 30 45 35 35 65 85	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7 11.25 7.5 11.25 8.75 38.75 38.75 38.75 38.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73}	Asset values Investment activities Loss to corruption Score Economical and Financial Capac Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics	None None Very High ity None None Very Iow Very High Very Iow Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high	25 21 21 41 21 40 45 30 45 35 35 65 85 50	0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environmental and Ecological Capacity Size of resource system	None None Very High Very How Very How Very High Very High	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very Iow $\sum C_{ij} w_j$ Very high Very high	25 21 21 41 21 40 40 45 30 45 35 35 65 85	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 1 0.25 0.25 0.25	3 3 5.857143 5.714286 30 7.5 7.5 7.5 7.5 7.5 7.5 8.75 38.75 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment and Ecological Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate	None None Very High None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very Positive	255 211 211 400 400 455 300 455 355 655 855 500 800	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7.5 7.5 11.25 8.75 38.75 38.75 38.75 13 17 10 16 8 8 8
C ₅₆ C ₅₇ f C ₆₁ C ₆₂ C ₆₃ C ₆₄ f C ₇₁ C ₇₂ C ₇₃ C ₇₄ C ₇₄ f ₇	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility	None None Very High None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very Positive Very High	255 211 211 400 400 455 300 455 355 655 855 500 800	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7.5 7.5 11.25 8.75 38.75 38.75 38.75 13 17 10 16 8 8 8
C_{56} C_{57} f_3 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} F_7	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity	None None Very High None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low High Low Low Low Low Low	Annual Real estate Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Medium Stable	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High Positive	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very Positive Very High	255 211 211 400 400 455 300 455 355 655 855 500 800	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7 11.25 7.5 11.25 8.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 4 6 4 6 4 6 4
C_{56} C_{57} f_5 C_{61} C_{62} C_{64} f_6 C_{71} C_{72} C_{73} C_{74} C_{74} f_7 B_{12} C_{74} C_{81} C_{82}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Energy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity	None None Very High <i>ity</i> None None Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low Low Low	Annual Real estate Equipment Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Stable Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High Low High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very high Very high Very High $\sum C_{ij} w_j$	255 211 211 401 400 405 455 300 455 350 655 855 500 800 000 400 400 400	0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7 5.714286 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} f_7 f_7 R_{22} C_{81} C_{82} C_{83}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Primary Source Alternative Source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	None None Very High <i>ity</i> None None Very low Very low	Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Negative Low Low Low Low Low	Annual Real estate Equipment Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very Positive Very High Very High Very High Very High Very High Very High Very high Very high Very high Very high	255 211 411 40 45 30 45 35 35 35 50 80 40 40 40 40 40 40 10	0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 7 5 7.5 11.25 8.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 38.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 C_{74} C_{74} f_7 C_{81} C_{83} C_{84}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Tenergy Capacity Primary source Alternative source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity Leadership/entrepreneurship	None None Very High (ty None None Very Iow Very Iow	Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Low Low Low Low Low	Annual Real estate Equipment Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate Intermediate Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very high Very high Very high Very high Very Positive Very High $\sum C_{ij} w_j$ Very high Very high	255 211 411 40 40 45 30 45 35 35 35 65 55 0 80 80 40 40 40 40 10 25	0.14 0.14 0.14 0.14 0.14 1 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	3 3 5.857143 3 5.714286 30 11.25 7.5 11.25 7.5 11.25 8.75 38.75 38.75
C_{56} C_{57} f_5 C_{61} C_{62} C_{63} C_{64} f_6 T C_{71} C_{72} C_{73} C_{74} C_{74} f_7 C_{74} C_{74} f_7 C_{81} C_{83} C_{84}	Asset values Investment activities Loss to corruption Score Economical and Financial Capace Primary Source Alternative Source Dependence for service Outage rate Score Energy Capacity Environment quality Size of resource system Predictability of resource dynamics Growth or replacement rate Resource sensibility Score Environmental Capacity Social and Cultural Capacity Communal ownership Political stability Equity	None None Very High <i>ity</i> None None Very low Very low	Basic accounting Real Estate Low High Non-conventional None Low Low Low Low Low Negative Low Low Low Low Low	Annual Real estate Equipment Equipment Medium Medium Conventional electricity Generator < 10 HP Medium Medium Medium Medium Stable Medium Intermediate Intermediate Intermediate	Increasing block rate Tracked bi-annually Real estate Equipment Cash High Low Electricity mid-voltage Generator < 50 HP High High High High High High High	Increasing block rate Tracked quarterly Real estate Equipment Cash - Stocks Very High None $\sum C_{ij} w_j$ Electricity high voltage Generator > 50 HP Very High Very High Very high Very high Very high Very Positive Very High Very High Very High Very High Very High Very High Very high Very high Very high Very high	255 211 411 40 45 30 45 35 35 35 50 80 40 40 40 40 40 40 10	0.14 0.14 0.14 0.14 0.14 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	5.8571 5.7142 111. 111. 8. 38.

Appendix IV.P.3: Chandempet Mandal – Timmapuram

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.A: Aggregate Community Capacity Grade – Bhongir Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.B: Aggregate Community Capacity Grade – Alair Mandal

Appendix V.C: Aggregate Community Capacity Grade – Yadagirigutta Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.D: Aggregate Community Capacity Grade – Voligonda Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.E: Aggregate Community Capacity Grade – Mothkur Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.F: Aggregate Community Capacity Grade – Choutuppal Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.G: Aggregate Community Capacity Grade – Devarkonda Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.H: Aggregate Community Capacity Grade – Huzurnagar Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.I: Aggregate Community Capacity Grade – Marriguda Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.J: Aggregate Community Capacity Grade – Miryalaguda Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.K: Aggregate Community Capacity Grade – Nakrekal Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.L: Aggregate Community Capacity Grade – Nalgonda Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix	V.M: Aggregate Community Capacity Grade – P.A.Pally
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Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.N: Aggregate Community Capacity Grade – Naryanpur Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.O: Aggregate Community Capacity Grade – Suryar

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership

Appendix V.P: Aggregate Community Capacity Grade – Chandempet Mandal

Grade	Institutional	Human Resources	Technical	Economic and Financial	Energy	Environmental and Ecological	Social and Cultural
A	 Strong local, Mandal, and District level regulation Local governance, minimal supervision Integrated government agencies High legislative standards for water quality 	 Heavy social capital Several higher educational institutions Training or mentoring facilities and programs Illiterates trained as operators or caretakers 	 Capable of complex water unit operations Experts with tech maintenance Reliance network is close to point of use Source is nearby point of use 	 Strong market Maintains accurate budget Very little corruption Users pay towards system use 	 Primary source powers groundwater pumps and filters Alternative source capable of drawing groundwater Low dependence Very low outage 	 No natural or manmade pollutants in water High groundwater level, rainfall High resource conscience Waste and wastewater curbing plans 	 Sense of communal ownership exists Low political rift No segregation or affirmative action necessary Women are leaders, not just participators
В	 Strong Mandal & District level regulation Local governance, Mandal supervision Legislative standards Communication between institutional agencies NGO presence 	 Medium Social capital Few higher educational institutions Illiterates trained as operators or caretakers 	 Capable of operating medium-level water technology Familiar with tech maintenance Reliance network is in neighboring Mandal Source is far from point of use 	 Strong market Maintains annual budget Some corruption Users pay towards system use, but collection rate is not high 	 Primary source varies over course of day Alternative source capable of drawing groundwater Medium dependence Outage no more than 8 hours per day 	 Some natural pollutants No manmade pollutants in water Resource supply > demand Resource conscience Some waste curbing plans 	 Sense of communal ownership exists Some political rift Some segregation or affirmative action Women participate in central activities Motivated leaders
С	 District-level regulation Little governance structure, relies on District officers No standards or legislation No communication between agencies 	 Low social capital Basic schools exist Apprenticeship in water management comes from agriculture experience 	 Capable of operating low-level water technology Maintains system without familiarity Reliance network is farther than immediate neighbor 	 Market exists Maintains annual budget Frequent corruption Users pay towards system use, but collection rate is very low 	 Primary source varies over course of day Alternative source can only power lights High dependence Outage no more than 16 hours/day, predictable 	 Some natural pollutants & manmade pollutants in water Resource supply = demand No resource conscience No waste cleanup 	 Little sense of communal ownership High political rift Heavy segregation or affirmative action Women participate in menial activities Leaders participate sometimes
D	 Little or no regulation Little or no governance, relies on District intervention No standards or legislation NGO intervention seen as necessary 	 Low social capital Basic schools exist, but no teachers Apprenticeship in water management comes from agriculture experience 	 Operates low-level water technology without background No system maintenance Reliance network is farther than immediate neighbor 	 No market Uncertain budget Frequent corruption No collection of user fees Low asset values Investors wary, little entrepreneurship 	 Primary source no more than 6 hours a day No alternative Very high outage, inconsistent and unpredictable 	 High natural pollutants & manmade pollutants in water Resource supply < demand No resource conscience No waste cleanup 	 No sense of communal ownership High political rift Heavy segregation or affirmative action Women do not participate Poor leadership