

The New Tank Institutions of the Cauvery Delta

A study about tank rehabilitation and institutional development in the diverse context of villages in the Cauvery Delta

Daniël Jesta de Raad



Student name Daniël Jefta de Raad
Student number 5780853
Email d.deraad2@students.uu.nl
Programme International Development Studies

Utrecht University supervisor Andres Verzijl

In collaboration with Ashoka Trust for Research in Ecology & the Environment, as part of the project 'Pathways to a Sustainable and Inclusive Cauvery Delta'.



ASHOKA TRUST FOR RESEARCH IN
ECOLOGY & THE ENVIRONMENT



Utrecht University

Faculty of geosciences

Abstract

In the theoretical context of common pool resource literature, this thesis focuses on questions of how sustainable and equitable management of tanks as common pool resources (CPRs) are shaped, by both bureaucratic and socially embedded institutions, in the Cauvery Delta, Tamil Nadu, India. Tanks are lake like structures with various uses, and institutional arrangements to govern them. In recent years there has been a reappraisal of tanks, as a means of storage, percolation and insurance against droughts and floods. Both government and socially embedded organizations, initiated rehabilitation schemes, introducing new institutions in tank settings.

This research focused on the implications of the introduction of these rehabilitation schemes on the development of institutional arrangements in tank settings. This was done through two extensive case studies of tank settings in which rehabilitation took place. These findings were supported by interviews with experts and members of socially embedded organizations and finally the review of relevant literature on the topic, region, and the historical development of tanks.

The results of this study indicated that the effect of schemes by bureaucratic and socially embedded institutions for sustainability and equitability in local settings are mixed. Sustainability for the productivity of the resource is questionable and schemes gloss over inequities. The findings shed light on the institutional plurality and complexity of institutions in tank settings. Actors with multiple identities mobilize various arrangements to legitimize and change their rights to water. Institutions are altered and adapted in local settings through relationships of power among subjects, creating both intended and unintended outcomes.

I argue for the inclusion of multiple uses and the consideration of ideological and cultural identities that underpin claims for non-subtractive rights to water, to inform institutional analysis, through the method of institutional bricolage. This supports comprehensive analysis of institutional arrangements in CPR settings, towards better adjusted policies, and sustainable and equitable CPRs.

Keywords: *Common pool resources, institutions, bricolage, socially embedded, bureaucratic, multiple use, water rights, sustainability, equitability, tanks, Cauvery Delta, Tamil Nadu, India*

Acknowledgements

When I heard that I was assigned to go to India for my thesis research, I was thrilled. The country had long interested me for its culture and spirituality and doing my research there on such an interesting topic excited me. Just before I was supposed to leave, the global pandemic hit. Although I have not physically been to the Cauvery Delta myself, sometimes I feel that I have, through my research and the amazing team surrounding it. I am grateful for this experience and all its insights.

Firstly, I would like to thank my thesis supervisor, Andres Verzijl at Utrecht University. He was always open to help me, provided me with essential advice and throughout my process of writing this thesis, his patience and understanding provided me with the motivation to complete it.

Secondly, I would like to express my sincere gratitude to the team over at Ashoka Trust for giving me the opportunity to conduct my research with them. Special thanks go out to Abraham and Vivek who provided me with so much data, and discussions in which they so lively described their observations. This truly gave me the sense of being there. I hope to meet you in person sometime soon!

I thank my friend Ben for providing me with company and a study space during Covid times. And finally, I am so grateful for the continuous support of my girlfriend and family throughout my studies and endeavours over the past years.

Daniël Jefta de Raad

Utrecht, August 2021

Table of Contents

ABSTRACT.....	2
ACKNOWLEDGEMENTS	3
LIST OF FIGURES AND TABLES	6
LIST OF ACRONYMS AND TERMS.....	7
CHAPTER 1 – INTRODUCTION	8
1.1 DETERIORATION AND REAPPRAISAL OF TANKS	8
1.2 MAIN RESEARCH QUESTION	10
1.3 CONTENTS OF THIS REPORT	10
CHAPTER 2 – CONCEPTUAL FRAMEWOK	11
2.1 THE PIONEERS OF COMMON POOL RESOURCES.....	11
2.2 MULTIPLE WORLDS OF WATER.....	13
2.3 CRITICAL INSTITUTIONALISM AND INSTITUTIONAL BRICOLAGE	14
2.4 PHYSICAL DIVERSITY	16
2.5 MULTIPLE-USE SYSTEMS AND WATER RIGHTS.....	17
2.6 CONCEPTS IN PERSPECTIVE.....	20
CHAPTER 3 – RESEARCH QUESTIONS.....	22
CHAPTER 4 – METHODOLOGY	24
4.1 POSITION AS A RESEARCHER	24
4.2 CO-CREATION DURING COVID	25
4.2 DATA COLLECTION	26
4.3 SAMPLING FRAMEWORK.....	28
4.5 DATA ANALYSIS	28
4.5 WORKING WITH AN INTERPRETER.....	29
4.4 COMPREHENSIBILITY, TRANSFERABILITY, AND PLAUSIBILITY	30
4.5 REFLECTION ON DATA COLLECTION	31
CHAPTER 5 – TANKS IN TAMIL NADU	32
5.1 ORIGIN OF TANKS.....	33
5.2 RECENT HISTORY.....	34
5.3 CURRENT STATE OF TANKS	37
CHAPTER 6 – EMPIRICAL RESULTS.....	40
6.1 THE KUDIMARAMATHU SCHEME	42

6.2 PREVIOUS CASE STUDIES	43
6.3 KALATHUR VILLAGE CASE STUDY	46
6.3.1 <i>The local youth group</i>	51
6.3.2 <i>The Kudimaramathu works</i>	53
6.3.3 <i>Rehabilitation outcomes and reactions</i>	55
6.4 THE KAIFA ORGANIZATION	57
6.5 ANNAVAYAL VILLAGE CASE STUDY	61
6.5.1 <i>The local youth group</i>	66
6.5.2 <i>The rehabilitation works</i>	68
CHAPTER 7 - CONCLUSION	72
7.1 DISCUSSION	72
7.1.1 <i>The motivation of multiple identities</i>	72
7.1.2 <i>Beyond subtractive and non-subtractive uses</i>	73
7.1.3 <i>Fluid rights to water</i>	74
7.1.4 <i>The new tank institutions</i>	76
7.1.5 <i>Expressing agency within structural constraints</i>	77
7.1.6 <i>The fruits and the futility</i>	77
7.2 CONCLUSION	79
REFERENCES	82
ANNEX.....	86
1 DATA OVERVIEW	86
2 FIELDWORK PLAN	86
2.1 <i>Topic list fieldwork interviews</i>	88
2.2 <i>Topiclist follow up Fieldwork</i>	89
2.3 <i>Themes for observation</i>	90
3 CODE TREE	91

List of figures and tables

Figure 1 Pudukottai (left) and Thanjavur (right), on a map of Tamil Nadu.....	40
Figure 2 Tank rehabilitation works in Pudukottai and Thanjavur	41
Figure 3 Paddy field (left) next to Kaaduvaakulam tank	49
Figure 4 The Kaaduvaakulam tank.....	52
Figure 5 Completion sign Kaaduvaakulam tank	55
Figure 6 The Vettukulam tank	63
Figure 7 The Vettukulam tank before desilting works	66
Figure 8 Vettukulam tank after rehabilitation works.....	69

List of acronyms and terms

AE	Assistant Engineer
BC	Backward Class
Block/Panchayat Union	Administrative subdivision of a district
CPR	Common Pool Resource
Crore	A unit equal 10 million
CSR	Corporate Social Responsibility
EC	Engineering Chief
Lakh	A unit equal to 100,000
KAIFA	Kadaimadai Area Integrated Farmer's Association
MBC	Most Backward Class
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MSP	Minimum Support Price
NWP	National Water Policy
Panchayat	System of local self governance in Indian villages
PDS	Public Distribution System
PIM	Participatory Irrigation Management
PWD	Public Works Department
WUA	Water Users Association
SC	Scheduled Caste
Taluk	Administrative division consisting of one or more blocks

Chapter 1 – Introduction

Water in the Indian context is a diverse subject, through its vast cultural, religious and agrarian importance. With a large share of agrarian households, water is at the center of life, is elevated beyond its practical use in Hindi culture and is looked upon as divine (Ramachandran 2006).

The Cauvery Delta is well known for its agricultural population and their cultivation of mostly paddy, making the region known as the “rice bowl” of India (Ramachandran 2006). Historically, farmers in the Cauvery Delta are dependent on surface water from rainwater, canals, and water tanks. Tanks are lake like structures used to store water, for domestic, agrarian, social and religious uses. Tanks are also seen as protection against droughts and floods.

1.1 Deterioration and reappraisal of tanks

Tanks were historically, collectively managed through traditional tank institutions in which the users themselves played a large role (Jegadeesan and Koichi 2011). These traditional institutions functioned relatively well until the 1970s. However, during the Green Revolution, the development of large scale gravity irrigation systems, the spread of tube well technology and decline in traditions of community management, led to the deterioration of tank management (R sakthivadivel and Shah 2018). Farmers started relying more on groundwater for irrigation as it is often easily accessible, reliable and more flexible than surface water (T. Shah 2009; Schlager 2007). The deterioration of tank water management accelerated during the 1990s when the influence of urbanization began to be felt in rural areas more directly and intensely (Jegadeesan and Koichi 2011). Overall, this led to many tanks to fall into disuse, resulting in the overall decline of area under irrigation of tanks.

However, the rise of groundwater use faced its own challenges. Aquifers form the invisible sub surface part of the hydrological cycle. The boundaries, structure and capacity of aquifers are difficult to define in comparison to surface water sources (Hoogesteger and Wester 2015). Access to the resource is often inequitable and in many regions groundwater tables started to drop due to over abstraction. Simultaneously,

farmers keep deepening their borewells to secure access to groundwater, as they are dependent on it (Janakarajan and Moench 2006). In addition, the supply of canal water had become less reliable. This in part caused by the continuous conflict between states over the distribution of the Cauvery river waters (Richards and Singh 2002). Increased climate variability and changed rainfall patterns has made farmers vulnerable, and many aquifers are under great stress (Nambi and Bahinipati 2013). Agricultural livelihoods are threatened, and farmers are at risk of losing their livelihoods. Governments now realize the importance of the historic water tanks as an insurance against droughts and floods. Farmers see increasing the storage capacity of tanks as the only way to stop declining groundwater levels (R sakthivadivel and Shah 2018). This has led to new initiatives for the rehabilitation of water tanks both the government as socially embedded movements.

Governance of common pool resources (CPRs) such as tanks has been widely studied (Hardin 1968; E. Ostrom 1990b; Cleaver and de Koning 2015). CPRs are resources defined by costly exclusion and subtractibility (Vincent Ostrom and Elinor Ostrom 1977). Exclusion means that anyone can access the resource and exclusion is difficult and costly. Subtractibility means that units can be taken from the resource by users. CPRs are governed through institutions, which are the rules and norms that shape and regulate behavior surrounding the resource (Merrey and Cook 2012). In common pool resource literature, there is a continuing debate on the role of governments and the possibility of community self-governance in CPR settings (Araral 2014). This study used the theoretical framework of CPR institutions to study the tanks in the Cauvery Delta. More specifically the emerging initiatives for tank rehabilitation. The Tamil Nadu government attempts to rehabilitate tanks through the Kudimaramathu scheme. On the other hand, there are socially embedded organizations who initiated tank rehabilitation projects with the goal of securing a better future for the region.

The current approach to tank rehabilitation lacks a scientific approach in which tank settings are placed within the framework of CPRs and institutional development to highlight processes and their outcomes in relation to equitability and sustainability. Placing tanks within this framework followed by extensive analysis provides the field of study with new insights of the workings of the chosen theoretical concepts in tank settings. This study investigated institutional development of tank governance through

case studies, providing insight in local institutional arrangements, the implementation of tank rehabilitation projects and their impact on aspects of sustainability and equitability. The results are held against concepts from common pool resource literature, informing them and contributing to them, ultimately providing handles for the future sustainable and equitable governance of tanks in the Cauvery Delta, Tamil Nadu, India.

1.2 Main research question

Through the above presented problem statement, this study aims to answer the following main research question in support of its goals:

*How are future **sustainable and equitable** management of tank CPRs shaped by rehabilitation schemes of both **bureaucratic and socially embedded institutions**?*

1.3 Contents of this report

Before presenting the results and implications based on the empirical findings of this study, chapter 2 will present a theoretical framework. Theories and concepts with regard to institutional development of CPRs will be presented in combination with concepts regarding multiple use of resources and water rights. Subsequently, chapter 3 will present the objectives and research questions of this study, followed by chapter 4, in which the conceptual framework and research questions are informed to shape the methodology to this study. This chapter elaborates on the research design and data collection. Chapter 5 presents the regional and historical context of tanks in the Cauvery Delta up until the current situation, after which chapter 6 will present the empirical findings of this study. At the end of this study, chapter 7 will provide a discussion of the findings in relation to the theoretical concepts, ending with the conclusion which serves as a summary and reflects on the implications of this study.

Chapter 2 – Conceptual framework

This literature review focuses on the evolution of literature on common pool resources and the institutions through which they are governed. Firstly starting this review with seminal studies such as ‘The tragedy of the commons’ (Hardin 1968) and ‘Governing the commons’ (E. Ostrom 1990) and how they contributed to the field of research today. This will be followed by more recent perspectives on institutional development and concepts of water rights and multiple-use systems, altogether shaping a conceptual framework surrounding tanks in the Cauvery Delta, Tamil Nadu, India.

2.1 The pioneers of common pool resources

Over the past half century scholars have paid considerable attention to the study of CPRs and the ability of resource users such as farmers, fisherman and pastoralists to govern and enforce rules for the use of common pool resources (CPRs) through institutions.

Institutions are defined by Merrey and Cook (2012, p.3) as:

“Social arrangements – rules, norms – that shape and regulate behaviour and persist, i.e. have some degree of permanence and purpose that transcend individual lives and intentions”

Vincent and Elinor Ostrom (V. Ostrom and Ostrom 1977), pioneers of the field, define CPRs as natural or man-made structures characterized by costly exclusion and subtractability of units. Costly exclusion meaning that controlling access by potential users is costly or in extreme situations virtually impossible. The second characteristic is subtractability, meaning that each user is capable of subtracting units from the resource and that exploitation by one user adversely affects the ability of other users to exploit the resource (Feeny et al. 1990). In the case of water, a common pool resource could be surface irrigation systems or groundwater basins, but other examples include, fisheries, forests and grazing lands.

One of the early and pivotal studies on the subject of CPRs was Hardin's 'Tragedy of the commons' (1968). Hardin's model predicted the inevitable overexploitation or degradation of all resources used in the common. Hardin argued users of commons as rational beings seeking to maximize their gain from a resource. Additional exploitation of a common resource by a user, gains that user more profit while the cost of overexploitation is shared by all users. Hardin argued this process would lead to the overexploitation and degradation of all common pool resources. To avoid the tragedy, Hardin concluded there are only two solutions to this problem. Privatizing the commons or government regulation of uses and users of the resource. Hardin's theory would become an important field of discussion and was viewed by some as a scientific law but was also criticized for being incomplete and would make way for less deterministic and other views and theories.

Hardin's work (1968) inspired many scholars to study the commons generating new insights. In the following period his work would be praised, criticized, and nuanced. Feeny et al. (1990) pointed out privatizing and state regulation of common resources often had adverse effects and sped up degradation of a resource. In *Governing the Commons*, Elinor Ostrom (1990) described a series of long enduring common pool resources, where institutions or 'rules in use' enabled individuals to utilize these resources over long periods of time, therewith challenging the commonly applied narrative that predicted the destruction of CPR's that were left without privatization or state intervention (See also, Ostrom et al. 1994). Indeed, Elinor Ostrom (1990a) showed that in many cases, individuals who jointly used a CPR, communicated with each other and created a shared set of rules to improve their collective benefit of the resource, thereby overcoming the tragedy of the commons. From cases where such institutions existed over longer periods, Ostrom derived a series of design principles that defined robust institutions. She argued for the existence of eight design principles most likely associated with successful institutions (See also, Ostrom 1990) This led to the school of new institutional economy where scholars were researching collective action and the commons.

The generalizability of Ostrom's eight design principles has been widely researched, praised and also criticized for being fundamentally flawed, for a lack of attention to the state and its structuring role in all contemporary resource governance (Araral 2014).

Agrawal (2014) argues that although commons research has been a successful research field, researchers have not clearly differentiated between the different measures and dimensions of commons outcomes in which they are interested. For example, 'successful institutions' are not the same as 'sustainably managed resources'. Commons outcomes are diverse and attending to this diversity is critical in future research to understand cause outcome relationships.

2.2 Multiple worlds of water

New institutional economics views commons as a 'resource', through the lens of rational choice. In this perspective actors rationally utilise social capital to make decisions towards optimal resource use (Cleaver 2002). Elinor Ostrom (1990) and other scholars studying the commons tried to design standard models to create successful institutions. But there are no universal models or panaceas to design institutions. The context of commons situations is both diverse and complex and needs concepts that cater to these characteristics. Recent studies have taken an even more radical departure and pay attention to the existence of 'multiple worlds', with different materialities and ways of being and interacting with something such as water. Challenging the assumption of a singular knowable world, proposing that we pay attention to the possibility that there are diverse ways of being with and interacting within multiple worlds (Yates, Harris, and Wilson 2017).

For example, the dominant 'world' or way of knowing water in western science is viewing water as H₂O. This then directly impact the way in which water is being handled and aspects such as conservation rationales or the perspective of rational choice. Another example is water as 'Siwkw', a materiality in which water is a more-than-human process of emergence, beyond it solely being a resource for consumption (Jeannette Armstrong 2003). Siwkw is a sacred word among the Okanagan people in British Columbia, Canada and is viewed as the highest and greatest form of medicine given to their people. In the Indian context water is not merely an element for practical

use. It is looked upon as divine, elevated to godly status and both respected and revered. Water in Hindu culture is closely associated with religion and is not only a physical purifier but also and more importantly a spiritual purifier (Ramachandran 2006).

Yates, Harrison and Wilson (2017) argue using a singular materiality of water and dismissing others as cultural construct is problematic and could lead to failed governance. The authors propose the ontological approach, which asks whether various materialities of water should be similarly accepted, rather than being continuously challenged or dismissed by hegemonic modernist ontologies. Using multiple ontologies to inform water governance attempting to pluralize our understanding of what water is and what management and governance should entail.

Although multiple ontologies of water are not the scope of this study, it provides a perception of complexity of a phenomenon which institutional economics tend to view from a singular perspective. From this concept of multiple worlds and multiple ways of knowing and being with water, this study will present concepts in relation to the commons that embrace the complexity and diversity of water.

2.3 Critical Institutionalism and Institutional Bricolage

Critical Institutionalism (CI) is a body of thought that explores institutions and how they dynamically mediate relationships between people, resources and society (Cleaver and de Koning 2015). It focuses on complexity and diversity of institutions in relation to daily life, history, the interplay of formal and informal, modern, and traditional and the power relations involved. Cleaver (2002) argues, the school of 'institutional crafting' for management of natural resources is based on concepts which are insufficiently socially informed and poorly reflect the intricacies of institutional formation. She argues against the simplified and unilinear evolution of institutions suggested in institutionalist thinking such as the eight design principles by Ostrom (1990).

Cleaver (2002) suggests the approach of 'institutional bricolage' as introduced by Douglas (1986), to better understand and analyse institutions and shape possibilities for resource allocation, adaptation and negotiated solutions (Cleaver and de Koning 2015). This concept suggests that people consciously and non-consciously shape and reshape

institutions drawing on the situation that is available. Mechanisms for resource management are borrowed from existing institutions, styles of thinking, and sanctioned social relationships. Elements of institutions are continuously reused and transformed. This implies that institutions are actively evolving, and existing decision-making arrangements and relations of cooperation may change for new purposes. In these processes, maintaining solidarity and cohesion can be as important as optimum resource management (Cleaver 2002). The continuous transformation of institutions forms the necessary responses to everyday challenges in daily life.

Cleaver (2002) proposes the terms 'bureaucratic' and 'socially embedded' to refer to institutions to replace the common dichotomous classification of institutions as either 'formal' or 'informal' and 'traditional' and 'modern'. Bureaucratic institutions represent formalized arrangements based on explicit organisational structures, contracts and legal rights. Socially embedded institutions are those based on culture, social organisation, and daily practice. An institution can be socially embedded and still have bureaucratic characteristics and vice versa. Together, local resource management arrangements are a complex blend of formal and informal, traditional, and modern.

Critical Institutionalism embraces institutional plurality and acknowledges that governance of a resource is spread across scales without a clear boundary, where national and global processes can affect local institutional arrangements. The concept of 'leakage of meaning' can be applied here (Douglas 1986), that legitimized arrangements, values, authority, or discourses can leak from one domain to another. The notion of protecting the most vulnerable, drawn from universal human rights and international development discourses, could for example lead to the poorest people in a local commons to be exempted from their duty to pay for maintenance or have some privileges in extraction from the resource (De Koning and Cleaver 2012).

When new formalized institutions are introduced in commons settings institutions are 'naturalised' (Douglas 1986) in which de Koning (2011) identifies three processes which happen: Aggregation, alteration and articulation. These processes refer to mixing the old arrangements with the new to create more practical institutional arrangements, followed by tweaking the institutions to make them fit the setting and lastly articulation, which involves asserting traditional identities and culture in resistance to the new institutions.

Actors in a commons situation innovate institutions within the boundaries of their resources, social circumstances and what is perceived as legitimate. According to Cleaver (De Koning and Cleaver 2012) actors are characterized by both agency and structural constraint, arguing against the mechanical view of actors who rationally utilise social capital to make decisions towards optimal resource. Individual actors are conceptualised as conscious and unconscious social agents, deeply embedded in the cultural milieu but still able to act upon the circumstances with which they are confronted. Institutional bricolage assumes people having multiple and dynamic identities and takes on a dynamic view of 'culture'. Representatives in committees directly represent the community interest. However, norms and practices are often formed and negotiated outside formal institutions. Institutional bricolage takes place in a wider arena than just the visible structures of institutions. Households and wider social networks are important in the generation of norms and practices of resource use.

Mosse (1997) presented similar findings in his study of tank in Tamil Nadu. Mosse observed that tank users were not limited to users who saw tanks as a source of irrigation water, but their main use lay in the diverse social roles such as locations of social standing, caste and cultural interaction. Self-organized institutions for common resources are thus not developed solely against degradation of the physical resource but also exist to mediate social roles (Forsyth and Johnson 2014). Bisung et al., (2014) argue, the social context in which collective action takes place is generally not adequately explored in current studies. For example, factors such as relations of power, social status, gender, community conflicts and religion are social factors that influence participation in collective action.

2.4 Physical diversity

Further diversity lies in the physical properties of a resource. As presented in introduction, both surface water and ground water are important in the study area. These sources both have their own characteristics affecting institutions. Groundwater forms the invisible subsurface part of the hydrological cycle. It is crucial for the maintenance of wetlands and the flow of rivers, and forms an essential part of many people's livelihood (Hoogesteger and Wester 2015). The boundaries, structure and

capacity of groundwater are difficult to understand. It is a horizontal resource to which access is gained through being situated above the resource. On the other hand, surface water has a strong upstream-downstream dimension presenting its own challenges in understanding the resource (Kemper 2007). Schlager (2007) argues local self-governance is possible for both surface- and groundwater irrigation but they will both show different structural features and require different linkages with higher levels of governments because of their contrasting physical nature. Much of the commons literature focuses on visible CPRs such as forests (Koning 2011) or pasture (Hardin 1968). In surface irrigation systems farmers can more clearly define the boundaries of the system (Schlager 2007). However, to construct and maintain surface irrigation systems, it requires investment leading to challenges of provision and appropriation problems. Schlager (2007) argues that, although surface systems are more conducive for the development of farmer-based management it does face its challenges in maintaining governance systems over time. As mentioned, groundwater systems are invisible on the surface but access typically minimally restricted and acquired with a minimal level of technology. For many farmers it is more reliable and timelier than surface water, and it requires lower upfront costs. The physical setting and its easy accessibility however create their own challenges of provision and appropriation. The boundaries and capacity are difficult to determine and identifying other users. In the context of Tamil Nadu this has resulted in the over abstraction and declining groundwater tables (Nambi and Bahinipati 2013). Groundwater users face an information poor environment which poses its own challenges for self-governance (Rose 2002).

2.5 Multiple-use systems and water rights

While irrigated agriculture is the primary user of the world fresh water supply, especially in low-income countries, there are many other uses of irrigations systems. Irrigation systems that use common pool water bodies, supply water primarily for field crops, but their role in supplying water for many other purposes is often overlooked in much work of CPRs (Edwards and Steins 1998). Water bodies like tanks often facilitate water for a wide variety of uses such as, fishing, livestock and watering cattle, gardens, domestic use, washing and bathing, but also leisure, and ritual or celebratory uses

(Ramachandran 2006). In addition, they serve a variety of environmental functions, and have the potential to threaten or maintain biodiversity.

These non-agricultural uses of water are part of many livelihood strategies and are important to be recognized, especially in contexts of increasing water scarcity. However, these other water uses besides irrigation are often overlooked in policies and management (Meinzen-Dick 2001). Other uses are often dismissed because when compared to agriculture they consume small amounts of water. While their use in volume seems little, their value for livelihoods is high. Besides the livelihood benefits these domestic uses are also shown to provide additional health and hygiene benefits (Smits et al. 2010). Ignoring other uses besides irrigated agriculture, risks reducing the overall productivity of the system. One factor that often strengthens this imbalance is that government departments concerned with water resources have only sectoral responsibility such as irrigation, drinking water or environment. Most governments deal with the overall responsibility over water resources while the implementing departments only focus on one use leading to imbalanced outcomes.

Meinzen-Dick (2001) argues water in irrigation systems has been structurally undervalued, failing to recognize the many uses. Meinzen-Dick and Bakker (1999) propose the perspective of multiple-use commons, including all different users in irrigation systems. A perspective recognizing all these different users and having them collectively inform decision making to improve overall productivity, as well as equity of water use. Taking all uses and users into account in water management can contribute to the higher overall productivity of these systems. More accurate assessment of water users, including all of them will better inform decisions about water allocation, lead to more productive and environmentally sustainable water use and more equitable and socially sustainable outcomes (Meinzen-Dick and Bakker 1999).

The perspective of multiple-use commons (Meinzen-Dick and Bakker 1999), and social aspects described (Mosse 1997)(Forsyth and Johnson 2014)(Bisung et al. 2014) are closely intertwined with water rights, and how water rights are created, consolidated, transformed and negotiated through social struggle. Edella Schlager and Elinor Ostrom (1999) identified five types of property rights which can be used for water. Subtractive rights – the right to take products from a system, non-subtractive - to enjoy a resource

without taking from the resource, management – to regulate and alter the resource, exclusion – to determine who has access, alienation – to sell or transfer rights to management or exclusion. This shows that water rights embody not only the productive use of a resource but also relationships among subjects. Boelens and Doornbos (2001) highlight water rights as relationships of power among subjects more than just a relationship between the “user” and just the “object” water. In this relationship some stakeholders have or obtain the power to influence the rights of others. Not only power structures that shape water rights, but a two-way relationship is observed in many studies. Rules, benefits and obligations in irrigation systems reflect existing power structure in society while in turn irrigation systems dynamics influence, societal power relations (Bolin 1990). Water rights being a product of relations among subjects can then involve many socio-economic aspects that affect the right to water of a person. Zwarteveen and Meinzen-Dick (2001) show that “gender”, “caste” and wealth affect water rights in India. In their study individuals were shown to be able to obtain water rights only when he or she had irrigatable land. Water rights are thus shaped by differences in class and wealth.

With growing water struggles all over the world, water rights are increasingly contested in society. Water represents both power and potential, resulting in both conflict and collaboration among societal groups to deal with water. Water scarcity both intensified confrontations over water rights but is also observed to be an incentive for the formation of strong common property institutions (Boelens and Doornbos 2001). In practice water rights are spread over an arena in which multiple normative systems for water rights coexist. There is the state normative system but also customary, religious, and local laws that together create a complex system of water rights. Actors mobilize different mechanisms to access water rights and they are formed and transformed through social struggle in which stakeholders contest and legitimize their rights through multiple coexisting normative systems. Official state law for example, does not simply translate into practice as planned by the authors. Enforcement and effectiveness of rights will vary based on the situation and context. In a situation where conflict over water rights arise, stakeholders will strategically select rules and procedures from normative systems that legitimize and strengthen their claims (Von Benda-Beckmann, K von Benda-Beckmann, and Spiertz 1998).

Having water rights often also provides the right to take part in decision making about rules, management, and the contents of water rights, creating a continuous changing of water rights on the ground.

2.6 Concepts in perspective

This chapter has attempted to shape a framework of concepts for analysis of tanks as common pool resources and the elements that shape and transform institutional arrangements surrounding these tank settings. This framework was set up not for the design of panaceas for water governance but with concepts in mind that recognize complexity, diversity and actors involved in institutional arrangements.

At the center of this framework is institutional bricolage as conceptualized by Francis Cleaver (2002). People here are the bricoleurs who consciously and non-consciously by people and follow processes in which mechanisms are borrowed from existing institutions, styles of thinking, and sanctioned social relationships. In this we recognize that institutions have bureaucratic or socially embedded elements or a mix thereof and that when presented in local settings face alteration. What highlights institutional bricolage is the recognition of institutional plurality and the actors that shape them. Water rights provides the framework to understand part of the arena in which bricolage takes place. Multiple normative systems for water rights coexist and a continuous social struggle forms and transforms water rights (Boelens 2008). These water rights are shown originate from state law forming bureaucratic arrangements but also more socially embedded systems, such as customary, religious and local systems. Actors in commons settings have multiple identities that shape them as bricoleurs and their multiple uses of a resource. They act within structural constraint and what is perceived as legitimized from these normative systems and navigate themselves within existing relations of power. They express agency by mobilizing institutional arrangements or rules and procedures from different domains to stretching the boundaries of what is legitimized.

Within this process it is important to acknowledge the multiple uses and users of commons (Meinzen-Dick 2001), highlighting not only productive users of a resource but other subtractive and non-subtractive uses. Informing this concept in analysis of commons helps to identify aspects equality in commons settings use and helps to identify the multivarious users that potentially shape institutions.

These interlinked concepts will form the basis for analysis of this study to recognize diversity and complexity of institutional arrangements and cater to a comprehensive analysis for answering the research questions presented in the next chapter.

Chapter 3 – Research questions

The objective of this research is to study collective to study collective action for the management and maintenance of local tanks CPRs as part of socially embedded and bureaucratic institutions., and to study how schemes for tank rehabilitation interplay with the local settings of uses and rights and how this shapes future sustainable and equitable management. Based on the overarching theoretical framework on institutional development in CPR settings, the main research question of this study is:

*How are future **sustainable and equitable** management of tank CPRs shaped by rehabilitation schemes of both **bureaucratic and socially embedded institutions**?*

In order to answer this question, the following sub-questions support this study in answering its main question:

1. *How do local communities **collectively manage** local tanks as **common pool resources**?*

Firstly, to understand the institutional development of tank governance through rehabilitation schemes, this sub question aims to answer how the local setting of a tank as a CPR is constituted. It is important to understand institutional arrangements that already exist, the physical setting of the resource, the multiple uses and stakeholders and the water rights in play. An analysis of the regional context and historical development of tanks as CPRs will support an extensive analysis of the current CPR settings.

2. *How do schemes by **bureaucratic and socially embedded institutions** **interplay** with the localities in which they are performed?*

Secondly, after acquiring an understanding of tanks and their local settings, sub question two aims to answer how newly introduced institutions interplay with the local tank settings in which they are performed. Answering this question through the analysis of how newly introduced formalized institutions are ‘naturalized’ on the ground.

Uncovering what institutional arrangements are mobilized to create a mix of bureaucratic and socially embedded institutions. This will show how diverse institutional arrangements are formed and transformed by bricoleurs.

3. *How do community collective action and schemes for tank rehabilitation together impact the **future sustainable and equitable management** of tanks?*

Thirdly, sub question three aims to answer how aspects of sustainability and equitability are impacted by rehabilitation schemes. More specifically what are the multiple uses of tanks and how are water rights affected by rehabilitation schemes? How does the physical setting of tank change through rehabilitation? This question will be answered through the analysis of changing water rights and multiple uses in relation to institutional development as the result of tank rehabilitation projects, supported by analysis of the physical outcomes in relation to sustainability of tank systems.

Chapter 4 – Methodology

With the research questions stated in the previous chapter this study aims to find out, qualitatively, the ways in which local tanks in the Cauvery delta are managed and how aspects of sustainability and equitability in tank settings are shaped by the introduction of new bureaucratic and socially embedded institutions. This chapter will continue by addressing the general approach to the study, starting with a co-creation plan followed by the methods. The section on data collection will present a detailed step by step process of the methods and how they were used, and an overview of the collected data. Linked to this, an explanation on validity and reliability of the data. Then data analysis will explain how the collected data is organized along with the strategy used for analysis. The chapter will conclude with a section on positionality and reflexivity of the researcher.

4.1 Position as a researcher

When carrying out research, we must always be aware of our positionality as a researcher and the impact this can have in collecting data. This positionality can pose various challenges during research. First and foremost, my social and cultural background affect the way in which I do research. My background in Human Geography and International Development Studies shaped my interpretative approach to research. From this background, people are at the center as the units of observation in my study, seeing people as the cause of certain phenomenon and simultaneously undergoing certain phenomenon's. This concept of human behavior is reflected in the theoretical concepts of this studies and the methodological decisions (van Thiel 2007). On one hand this is a strength but on the other hand potentially leads to biases and omissions. From my background these could be biases towards government policies and the romanization of individual actors and grassroots initiatives. This is an aspect that I have continuously reflected on during the study.

As I have grown up in a Western European country, my experiences, ideologies, norms, and values are shaped within the location that I live in. During my data collection and interpretation, I acknowledged that my background is most likely very different to the subjects of my study. I acknowledge that my understanding of certain contexts and situations was very limited in the research area. Throughout the process of this research, continuous conversations about this study, its data and the many discussions were used to become and stay aware of this aspect. Keeping this in mind and acting on it, during collection and the interpretation of the data. Also, informing myself of the wider social context helped me to get an understanding of how both social and political context might have shaped or constrained the research (Hennink, Hutter, and Bailey 2011).

4.2 Co-creation during covid

This study was executed in close collaboration with Ashoka Trust. The organization is working on an ongoing project in collaboration with Utrecht University by the name of 'Pathways towards a sustainable and inclusive Cauvery Delta' project. The project aims at understanding the interconnection between physical, chemical, biological, institutional, and socio-economic processes that interact in deltas. This study was designed to be a part of, and a contribution to, this overarching project with a specific focus on the area of institutional and socio-economic processes regarding tank governance. With this interconnection of social and technical aspects, productive collaborations came to exist, exchanging knowledge and ideas, leading to new insights towards the goals of the project. Meanwhile the studies mutually benefited from the collaboration.

Firstly, weekly discussions have been held to update on progress and further collaborative efforts among involved researchers. This supports acquiring a better understanding of each other's works and connects studies in different academic fields. Possibly most importantly, these meetings developed personal relationships among researchers and gave insight in cultural differences and the local culture of the studied region itself, which then enhanced communication and collaboration in later stages. This led to a closer collaboration with the researchers involved in a citizen science campaign and the fieldwork in the delta.

Previous fieldwork was discussed to create insight among researchers, which led to interesting discussions, ultimately resulting in follow ups in other directions to enrich to overall wealth of the projects insights. A collaborative survey was designed to acquire data for both technical and social aspects which ended up not being fruitful but leads to other forms of acquiring data. This was done through the design of case studies which were studied through fieldwork, which was the main source of data for this study. In various meetings the scope of these case studies was adjusted based on shared knowledge in which I brought understanding of concepts of institutional arrangements which were turned into concrete topic lists, adapted to local contexts of which Indian the based researchers had extensive knowledge. These meetings supported my insight into local customs, culture, and dynamics in tank settings of which the Ashoka Trust researchers could provide lively stories. Altogether this enriched this study, provided leads for follow up and partly substituted the experience of being there myself.

The existing Ashoka Trust network was mobilized for fieldwork in this study to which I could add new connections through online networking, resulting in a shared list of contacts for both this study and future efforts.

Altogether continuous collaboration, sharing of ideas and intercultural and interdisciplinary work, led to the cocreation of new knowledge spread over different fields of research towards the goals of the project, Pathways towards a sustainable and inclusive Cauvery Delta.

4.2 Data collection

For this study, a mix of data has been collected consisting of qualitative descriptions from interviews, case studies, focus group discussions with Ashoka Trust researchers, previous research of Ashoka trust, enriched with literature research of policy and previous research on the topic.

A qualitative approach to data collection has been chosen. Although the data is less generalizable for its small number of interviewees, the method is best suited for the chosen theoretical concepts. Qualitative data provides rich descriptions to uncover diverse aspects that shape institutional settings surrounding CPRs, suited to the focus of institutional plurality in critical institutionalism (see also Cleaver and de Koning

2015), the many uses of commons (Meinzen-Dick 2001) and social struggle for water rights (Boelens and Doornbos 2001). However, the ongoing COVID-19 pandemic limited possibilities for me being present at the research area limiting opportunities for preferred methods such as participant observation. Therefore, alternative research methods have been deployed, suited to working from home distance to the actual fieldwork area.

Firstly, descriptions from previous fieldwork and several group discussions were collected as data for this study. These provided a first insight into the local settings of the study area. I acknowledge that this data is already interpreted by researchers with knowledge of the topic and used them for acquiring an understanding of local settings, culture, customs and as a foundation and starting point of my previous research.

Secondly, a survey has been carried out through the citizen science campaign set up by Ashoka trust. This survey was aimed to provide mostly quantitative data to support the predominantly qualitative data gathered in this study. Additional qualitative data was aimed to be collected through the option of adding voice recordings to the survey through which narratives and experiences could be gathered. However, this survey, as mentioned earlier, did not prove useful to this study. There were too little respondents in the study area for it to be useful. The survey which was located on an online platform was unable to reach the target group of tank users.

At the center of the data in this study are two case studies in geographical vicinity and similar settings. The choice for two case studies is related to the main research question and chosen concepts of this study which aims to uncover how bureaucratic and socially embedded institutions shape tank institutions. One case study had presented more bureaucratic elements and the other more socially embedded (see also, Cleaver 2002). The data constitutes interview transcripts and observations extensively discussed during focus group discussions. Case studies are generally less generalizable, but this was not the aim of this study. It concentrated on a limited number of situations but did so in great detail to contribute to the solution of a concrete social issue (van Thiel 2007). Elements of the results could be extrapolated and applied to other settings, informing, and contributing to theoretical concepts.

Other data was collected through interviews, with experts, actors from tank settings, and a student group, to create a varied and comprehensive overview of the topic.

Data collection has been completed with the addition of desk research of existing research and literature of tanks and policy analysis, to be complete and be held against the primary data and the concepts in this study.

4.3 Sampling framework

For the selection of the case studies a non-probability purposive sampling based on discussions on criteria of the units to study and theoretically relevant criteria (van Thiel 2007). The criteria used were 'geographical vicinity' between the cases to assure similarities in customs and setting. The cases had to include tanks where rehabilitation projects were completed in recent years and finally the theoretical criteria of the involvement of both socially embedded as bureaucratic institutional elements in these tank settings (Cleaver 2002). Within the fieldwork itself the units of study were selected following purposive sampling in which the researchers used the criteria of units making 'use' of the tank (see also R. S. Meinzen-Dick 2001), and being located in the tank setting in this time. I acknowledge that unit selection could have benefited from probability sampling to ensure greater validity and reliability of the data, but this was not feasible in the limited time of the case studies.

For the remaining interviews with experts a snowball sampling was used in which selection took place via the units of study, resulting in interviews with various members of socially embedded organizations. Further interviewees were selected following their previous experience with the topic, in this case academics, journalist and a student group.

4.5 Data analysis

The qualitative data in this study was analyzed through a process of both deductive and inductive coding. Data collection and analysis were interlinked, and some analytic tasks started during data collection to create opportunity for new insights to arise and lead to new data collection.

The process of coding the qualitative data in this study was carried out through both deductive and inductive coding. The deductive codes have been derived from concepts or theory in the research literature or for example topics in the interview guides. The inductive codes originate directly from reading the data and embody the subjects and issues raised by participants. After creating deductive codes, a process of open, axial and selective coding is started. Fragments of the data are reviewed for their value and relevance in relation to the study subject and then assigned a corresponding code. The data is analysed this way, ending up with a provisional list of codes. As coding of the data continues, codes change or emerge through axial coding. In this process, proposed codes are reviewed to see if they sufficiently cover the data, and existing codes are altered or added if needed. Coded fragments are reviewed to check if the code is sufficiently described, and codes are split up or merged into new codes if needed. In addition, coding is clustered in groups with main codes and sub codes. Through this process open coding is defined by exploring the data while axial coding is aimed at more detailed analysis of the data. Open and axial coding alternate throughout the process of analysis. The last part of analysis is done in selective coding. In this phase the data is reviewed in strong light of the problem statement of the study and the theories and concepts. The data is reviewed with a strong emphasis on details, nuances, and relations between the different coded fragments within the data. Aiming towards creating an detailed overview of the results of the study (Boeije and Bleijenbergh 2019). The code tree that resulted from the analysis of the data can be seen in the annex of this study.

4.5 Working with an interpreter

The research is conducted among people of which most did not speak English. Interviews in the case studies were mostly done in the Tamil language, which poses various challenges in the process of interviewing and interpreting the data.

The match between an interpreter and interviewee in terms of social characteristics is regarded as an important factor. In particular factors such as, gender, culture, religion and age are seen as important (Temple and Edwards 2002). The interviews were mostly carried out by Ashoka Trust researchers who are conducting research on a similar topic. The researchers although not from the same region in India, are more familiar with

customs and practices. In working with an interpreter every translation of meaning involves an interpretation of the rationales which cannot be conveyed to other languages. Here it is important for the interpreter to also know his positionality and be reflexive about his/her position in the research. Before going into the field, it was important to establish a connection with the researchers, acquiring an understanding of each other, our goals, and methods. Overcoming cultural differences and different academic backgrounds through various conversations throughout the process. The data resulting from the fieldwork, consisted of literal translations, including pictures and when literal translation was not possible Tamil proverbs and short explanations. I acknowledge that some information was lost in translation realizing that differences in vocabulary between languages but also between me and the interpreter affected some data. To underpin this, after field visits evaluation and discussion helped to review the data and our interpretations of the data.

4.4 Comprehensibility, transferability, and plausibility

The controllability and repeatability of qualitative data analysis is less clear than in quantitative studies. This is why in this qualitative study we speak not of reliability and validity but of comprehensibility, transferability, and plausibility (van Thiel 2007). Comprehensibility, meaning the study can be repeated and thus being reliable, transferability refers to the external validity of the results, or their generatability and plausibility refers to the internal validity. To ensure the comprehensibility of the study the sampling strategy offers understanding of the units of study and during analysis a comprehensible strategy was used in combination with the program Nvivo 12, which forced a systematic approach to analysis. This ensures the repeatability of the study. As for transferability, the results do not aim to prove causality or generalizability but focus on deriving narratives and results are only applicable to the cases studied. The results are used to inform and contribute to theocratical concepts that were tested in this study.

4.5 Reflection on data collection

In this section I reflect on the process of data collection and challenges that presented themselves (Boeijs and Bleijenbergh 2019). The qualitative data in this study consist of case studies and interviews. For the case studies I worked closely with the Ashoka Trust fieldwork team. During this process I experienced how our solely digital communication and possibly cultural differences sometimes led to miscommunications on what someone meant or intended. Sometimes I felt that I was misunderstood or felt that I misunderstood others, and this was not simply solved by explaining it again. Partly getting more acquainted helped but it was also embedded in different ways communication and expectations. This affected the fieldwork, although not in a negative sense, and it was mostly a very insightful experience.

For the expert interviews I hoped to reach government officials and academics who had done previous research. Although I did reach academics and they provided me with leads and insights, they were not open for interviews. As for government officials, I was referred to one who had closely worked on the Kudimaramathu scheme. He didn't reply which is always a possibility, but I was not able to find any other English-speaking officials. The findings would have benefited from this perspective. The journalist I interviewed was extremely helpful and provided many insights. However, I felt that he was biased on the subject which I had to keep in mind during analysis. Lastly, I interviewed several people from socially embedded organizations who were all enthusiastic to contribute. Sometimes their enthusiasm made me wonder what they thought of me and what they got out of this. These interviews were helpful. Also, in these conversations I noticed how differences in communication led to misunderstandings. My lack of ability to speak Tamil and the basic English of some respondents limited the data I got from some of these conversations.

Chapter 5 – Tanks in Tamil Nadu

In India, a ‘tank’ (or *eri* in the Tamil language), is a seasonal water reservoir, mainly used to store water to irrigate farming fields downstream (Aubriot 2011). Tanks are part of an age-old tradition of harvesting and storing local rainfall and water from rivers and canals for later use (R sakthivadivel and Shah 2018). Historically their primary use was irrigation, with secondary purposes being drinking water (for livestock), washing, bathing, fishing and percolation into aquifers, while also providing resources such as: water, fish, trees, grass, silt, soil (Aubriot 2011). Tanks are inextricably linked to social life (Jegadeesan and Koichi 2011), serving as community space used for the performance of sacred rituals and festivals. In Hindu culture, water beyond its practical use was the center of life and intricately connected with religion, being looked upon as divine (Ramachandran 2006).

The state of tank irrigation has changed drastically in recent decades. Various developments and trends have led to the deterioration of tank management. Many tanks have fallen into disuse creating adverse effects on the livelihoods of surrounding populations. Farmers take pride in agriculture, which has been their source of livelihood for generations. They strive to continue agriculture even if it is not profitable. But they too have experienced how the water supply and tank management have changed (Fieldwork day 4 interview 2 2020; Fieldwork day 1 interview 2 2020). In the face of water scarcity due to dropping groundwater tables, changing rainfall patterns, and droughts there has been a renewed interest in the importance of tanks as an insurance against droughts, floods and their use for irrigation. Both the government and socially embedded movements have taken interest in tanks, using different methods for rehabilitation. The tank rehabilitation movements believe in the resilience of the delta and its strength to bounce back. They see the necessity in their efforts, are convinced of their ability and determined to secure a better future for the delta,

“Take for example of delta, it will get evolved. Many people and many organizations are there, doing many things. This is a strong region in the history. We can see that this area has been built up naturally. So definitely it will bounce back.” (Fieldwork day 6 interview 1 2020)

5.1 Origin of tanks

Tank irrigation in India has existed since Vedic¹ times, but most tanks have been built in the 18th and 19th century by kings and Zamindars² (Palanisami and Easter 1983). Tamil Nadu counts more than 39 thousand tanks at the present, that with some exceptions, facilitated irrigated paddy³ cultivation for which the state is known. Historically but also in current times states hold proprietary rights over tanks and undertake occasional repairs. Beyond that the state had little to do with the management of tanks (Mosse 1997). Tanks were predominantly managed by socially embedded institutions with local customs and norms (Jegadeesan and Koichi 2011). Such institutions had varying results and a considerable variation is found in the extend of institutionalized cooperation between tank users (Mosse 1997).

As mentioned, tanks in India have existed for thousands of years. In those days, they were managed through the age-old practice of Kudimaramathu. A practice in which historical dynasties gave great importance to the construction and management of small water bodies with active community participation. Leaders further incentivized communities to self-govern water bodies by offering them adjacent or nearby lands (Rajendran 2018). In recent centuries many tanks were constructed and maintained following the 'mirasi' system of land tenure, through which clear rules regarding repairs and distribution were defined. Village land owners collectively had authority and responsibility for the maintenance of tanks (R sakthivadivel and Shah 2018). The Mirasi institution lost importance due to agrarian change and social mobility during the British colonial period that started in the 19th century (Bandopadhyay 2009). Another informal tank institution was that of the 'neerkatti' or waterturner. A lower tank officer who operated the tank sluices, and performed field water management. This person was also responsible for water use at farm level and he was paid by the villagers after the crop harvest. This role was derived from a pre-colonial caste-based social order that organized agricultural production and caste society, and functioned quite well until the

¹ 1500-1100 BC, the Indian Bronze age

² Historical state rulers first introduced during the sixteenth century by Muslim kings. Autonomous or semi-autonomous rulers that functioned as a tax-collector often, having large landholdings. Zamindars were later adapted within British rule as tax collector and landholder (Palanisami and Easter 1983).

³ A flooded field of agricultural land used for cultivation of semiaquatic crops, most notably rice cultivation.

1970s. Whereas the Mirasi system functioned through higher caste landowners, the role of neerkatti was held by members of the Pallar⁴ caste and their appointment was hereditary, although the waterturner could be replaced if his service was not adequate (Palanisami and Easter 1983). Such institutions regulated water storage and distribution, however almost never in an equitable way. Social control over access to tank water served a collective need to secure livelihoods and manage risks. However, these institutions were almost never equitable. Usually, the interest of poorer, lower caste, tail end farmers and women were poorly represented in management. Or farmers would manipulate publicly endorsed rules for water allocation to meet personal needs (Mosse 1997).

According to Mosse (1997) it is equally important to view tanks not as isolated cases but as a part of an interlinked tank system. Locally specific factors such as rainfall, hydrology and cropping affected surplus or scarcity, creating an informal market in which water was traded, gifted and exchanged between villages over distance. These transactions are based on social relationships based on proximity, caste or kinship, showcasing the importance of such factors in the allocation of water.

The presence of the many tanks in Tamil Nadu and their institutions regulating maintenance and repairs, facilitated in their large share of total irrigation during the 20th century. In the 1950s, nearly 40% of the irrigated area in Tamil Nadu was irrigated by tanks, in 2000 this figure had decreased to only 20% (Palanisami and Easter 1983) and this number continued falling through the 2000s and 2010s. Whereas the absolute area under tank irrigation in 1960-1961 was 4.63 million ha, in 2013-2014 it had fallen to a mere 1.98 million ha (R sakthivadivel and Shah 2018). Tank use for water storage and supply for multiple uses has lost its importance due to a variety of factors which will be elaborated in the following paragraph.

5.2 Recent history

These factors first arose during the 1960s and 1970s when rural India drastically changed under the influences of globalization, resulting in both economic development and

⁴ A Tamil sub caste of peasant in the Indian state. Traditional farmers, producing food grains (Palanisami and Easter 1983)

rapid urbanization. Two main fields of change are observed. First of which is technological change in agriculture through the 'green revolution'. The second is rapid urbanisation and the development of non-agricultural sector jobs (Fujita 2011).

The "Green Revolution" started in northern India in the mid/late 1960s and led to food self-sufficiency by the end of the 1970s. However, this first wave of the green revolution did not contribute greatly to the living standards in southern rural areas because it was mainly confined to the wheat crop. The second wave occurred during the 1980s and covered many of the major crops among which rice, which was the main crop in Tamil Nadu. Resulting in raising rural incomes and improving livelihoods and the drastic increase of food production (Fujita 2011). There were two main policies that underpinned the Green Revolution in India. The Minimum Support Price⁵ (MSP) and the Public Distribution System⁶ (PDS). The MSP provided food procurement which offered a guaranteed price for wheat and rice harvest, giving incentive for growing these water intensive crops. The PDS, first established in the mid 1960s, provided the distribution of basic necessities through networks of fair price shops (Pingali, Mittra, and Rahman 2017). Giving incentive to growing water intensive crops and changing diets from nutritious nutri-cereals to less nutritious crops (Drèze and Khera 2017).

During the same period there was a shift in irrigation methods. Whereas a large portion of irrigation was provided by tanks, open dug wells had also existed for a long time. Groundwater would be extracted with bullock power, providing only very low irrigation efficiency. But since the early 1970s energized pumps spread quickly and irrigation efficiency for the use of groundwater increased sharply (Fujita 2011). The intensified groundwater use was stimulated by the government subsidized electricity policy, easy availability of credit to dig wells and buy pumps, and the food procurement policy (MSP) which provided a guaranteed price for rice and wheat crops. These policies were introduced to encourage farmers to adopt Green Revolution technologies initially. Providing electricity to rural areas, mainly for electrification of groundwater pumps, became an important policy priority in the late 1960s. These combined trends ensured

⁵ The Minimum Support Price (MSP) is a policy measure by the Indian government to provide farmers with fixed prices for their crops to provide a minimum profit (Mukherji 2020)

⁶ The Public Distribution System (PDS) is a policy measure by the Indian government, facilitates the supply of food grains and essential commodities to a large number of poor people through a network of fair price shops ('Department of Food and Public Distribution' 2021)

high returns on irrigation, leading to a sharp rise of private investment in groundwater wells.

Whereas at first wells were metered and farmers were billed for their actual electricity use, flat tariffs were introduced in the 1970s, irrespective of actual use. On one hand this incentivized the sale of irrigation services in competitive water markets, benefiting small and marginal farmers. On the other hand, the flat tariffs badly reflected actual costs which led to financial distress for state electricity boards, resulting in poor quality and unreliability of the electricity supply. These policies remained the same for decades, leading to the depletion of groundwater levels (Mukherji 2020) and the deterioration of tank management.

During the 1980s rural incomes were rising, accelerating economic growth, mainly in the non-agricultural sector. The growth of non-agricultural sectors accelerated the shift from agricultural to non-agricultural jobs, which then resulted in a substantial rise in agricultural wages. However, during the 1990s the agricultural sector started to stagnate, causing a widening divide between rural and urban areas. The development of non-agricultural jobs was strongly felt in rural areas. In combination with droughts during the 1990s and early 2000s there was increasingly little incentive for water turners to continue working as the use of tanks was decreasing. This resulted in the deterioration of the traditional tank management system of the waterturner (neerkatti) (Fujita 2011). As non-agricultural jobs developed, and wages were rising in those sectors more people in agricultural jobs started to seek jobs in other sectors and villages. Many migrants mostly wealthy or from a high caste migrated to urban areas, engaging in white- and blue-collar jobs, providing more stable employment throughout the year. Farmlands were gradually transferred to members of other, lower classes and castes. Second there was an increase of renting farmland, especially by scheduled caste (SC) people, fracturing former large and medium sized farmlands among small scale tenant farmers in the command. This complicated tank water management, by having more stakeholders involved. This change in landownership also caused a shift in the agricultural workforce, from hired labour to one which is more reliant on family labour. Landowners of higher/wealthier caste used to hire a lot of their labour but with the shift to small landowners of lower caste there was less hired labour to save money (Fujita 2011).

At the same time, mass urbanisation caused a strong increase of urban land prices after. This resulted in housing developers moving their activities to rural areas where they illegally occupied land, often located in the foreshore of tanks. Therewith, blocking water supply, causing conflict and complicating tank management. These factors combined led to the deterioration of the traditional tank management system, changing the traditional agrarian society in Tamil Nadu (Fujita 2011).

5.3 Current state of tanks

The state of tanks is partially defined by bureaucratic governance of water resources. Water governance is spread among institutions across various scales and stakeholders, creating a complex system of decisions and interventions. On a national level The Ministry of Water Resources and supporting agencies are responsible for planning, formulating policy, and coordinating water resources at a national level. This national water policy regarding water resources is spelled out in the National Water Policy (NWP) 2012, with former versions in 2002 and 1987, with a new version being worked on currently. Although the NWP addressed the need to limit individual and collective water withdrawal it failed to resolve economic and institutional issues (Saleth 2005). Along with the NWP, individual states are encouraged to have their own water policies. However, the lack of coherent and consistent planning of water management has led to several interstate disputes over water distribution. The Cauvery river, which runs through Karnataka and flows into the sea at the coast of Tamil Nadu, is known for its ongoing dispute over the distribution of the Cauvery water. Both states demand a larger share of the available water and the dispute remains unresolved (Ferdin, Görlitz, and Schwörer 2010).

When we return to a state level, we see Tamil Nadu governance is spread over 40 departments, of which the Public Works Department (PWD) is one of the larger departments. The PWD is responsible for the public sector works in the state of Tamil Nadu and handles the implementation of irrigation schemes and management of water works. This is entrusted with a subdepartment of the PWD, the Water Resources Department. Tanks with a command area larger than 40 acres or system tanks⁷, are

⁷ Canal fed tanks which are in connection with up- and downstream tanks

under the control of the PWD. Rain fed tanks with a command area of less than 40 acres are controlled by the Panchayat Union, or block (M. Shah and Sakthivadivel 2018). A panchayat Union is part of a three-tier division for rural institutions. The Panchayat Union represents a group of villages and serves as a link between the villages and the district.

In 1987 the Ministry of Water Resources first issued guidelines for farmers participation in irrigation management with the aim of improving the performance of public irrigation schemes. This is when Participatory Irrigation Management (PIM) was first introduced. Under this approach water is supplied to the Water Users Associations (WUAs) who then have responsibility over maintenance, repair, operation and management of the irrigation systems in their area (Kulkarni et al. 2011). WUA's were part of a global development discourse during the 1970s resulting from centralized management of irrigation systems underperforming. Researchers and development organizations promoted the concept of WUA's as an alternative to centralized governance thinking they would provide better functioning irrigation systems (Aarnoudse, Closas, and Lefore 2018). With this approach some authority is given to Water Users Associations (WUAs) to manage their own primary or secondary canals or sources such as tanks. Farmers participatory irrigation management and Water Users Associations are managed in the Tamil Nadu Farmers' Management of Irrigation Systems Act, 2000 (Tamil Nadu Government 2000). The area in which a WUA is active is based on the total command area of the irrigation system. Meaning that all connected tanks and their command areas delineate the WUA area. The WUA consists of all water users in that area provided that those persons are landholders, in the command area. Every WUA has an elected managing committee. The idea behind creating WUAs is to: "promote and secure distribution of water among its users, adequate maintenance of the irrigation system and the efficient and economical utilisation of water to optimize agricultural production" (Tamil Nadu Government 2000). However, since the introduction of WUAs, many have gone defunct, leaving infrastructure in farming areas largely unmaintained. Aubriot (2011) argues WUAs were formed without proper institutional support and the existence of customary institutions, resulting in low standards of operation and maintenance.

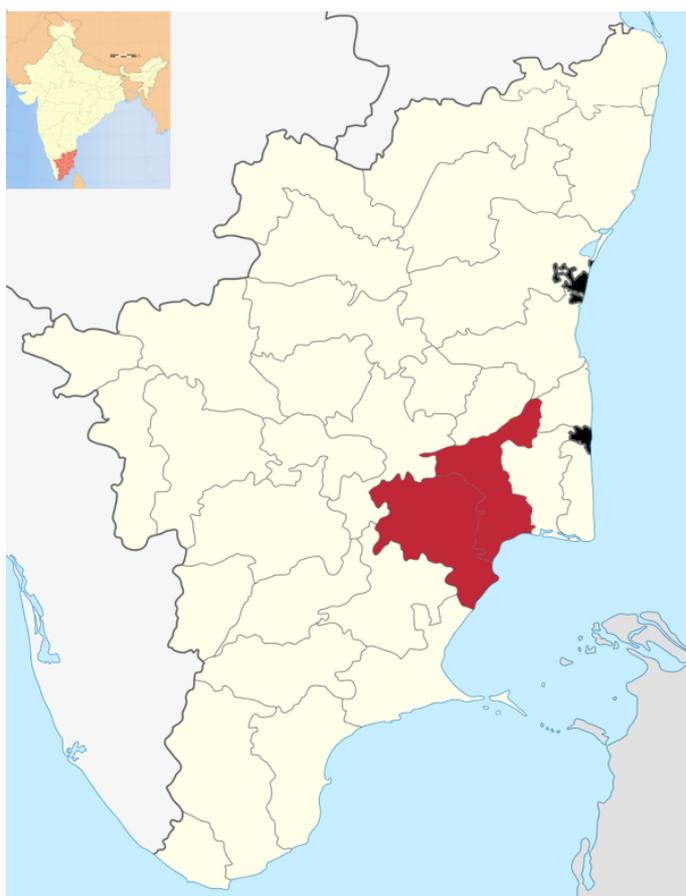
The current state of tanks and their management is defined by many tanks having gone defunct. Tanks that used to provide storage for floodwater, recharge of groundwater, and water during dry spells have fallen into disuse, due to encroachments of lakebeds, construction in supply channels and invasion of *Propolis Juliflora*⁸ trees (R sakthivadivel and Shah 2018). Areas once irrigated by tank water and rainwater are now solely irrigated by tubewells, leading to the overexploitation of groundwater and insufficient recharge. Farmers who are dependent on groundwater are continuously deepening borewells to ensure access to water, driving them into rising debts. Simultaneously causing competition for water and inequities between well-owning and non-well-owning farmers (Janakarajan and Moench 2006). Non-well-owning farmers are dependent on uncertain supply from canals and rainfall, limiting them to one season of crop per year while well-owning farmers more often have sufficient water for two cropcycles. In recent decades there has been a reappraisal of tanks as assurance against droughts and floods and means for storage and percolation into aquifers. Various pilot studies emerged on the artificial recharge of groundwater and around 1990 continuously declining groundwater levels have led to public and government become more aware of artificial recharge. Public supported by religious leaders, philanthropists, NGOs and committed individuals took up work, later also linking up with governments (Ramaswamy 2007). This has taken form in government-initiated schemes focused on tank rehabilitation and socially embedded initiatives on the ground.

⁸ A bush like tree, and invasive species to Tamil Nadu. A threat to tanks, by increasing evapotranspiration and obstructing groundwater recharge (R sakthivadivel and Shah 2018).

Chapter 6 – Empirical results

This study focused on two initiatives for tank rehabilitation in Tamil Nadu. Firstly, the government initiated Kudimaramathu scheme, which attempts to rehabilitate defunct water bodies all over the state. Secondly the socially embedded organization named the Kadaimadai Area Integrated Farmer's Association (KAIFA). A voluntary organization that has taken up tank rehabilitation after the 2018 cyclone Gaja which devastated the Cauvery Delta. They started out with finding ways to reverse the damage the cyclone had done and improve conditions for farmers. Later adjusting their focus on the rehabilitation of local water bodies with the help of social media and crowdfunding, resulting in the rehabilitation of 57 tanks to date (Ramkumar 2019).

Figure 1 Pudukottai (left) and Thanjavur (right), on a map of Tamil Nadu



Source: Wikipedia

The study area was delineated from the region in which KAIFA is actively performing tank rehabilitation works. Their works are focused on the districts of Pudukottai and Thanjavur, highlighted on the shown map of Tamil Nadu. The districts are located in the southeastern part of Tamil Nadu, bordering the coastline. Pudukottai and Thanjavur district have a population of 1,618,345 ('Pudukottai District' 2021) and 2,405,980 respectively ('Thanjavur District' 2021). Both districts are known for their agricultural workforce and depend mostly on monsoon rains

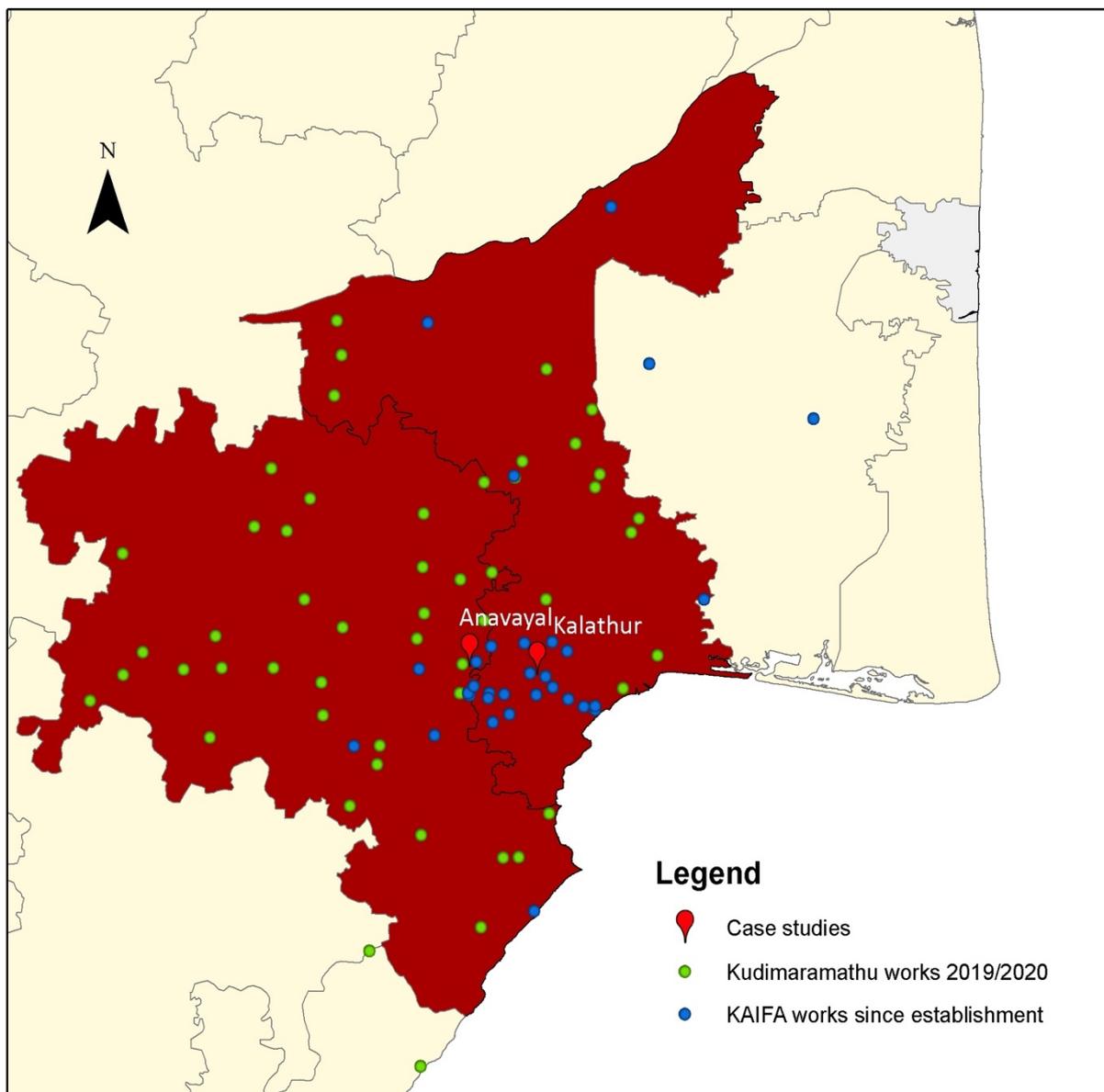
for their water supply. System tanks in the districts are supplied by the Grand Anicut canal, a branch of the Cauvery River. As mentioned earlier, the Cauvery River is known

for its interstate dispute. The river that stretches over multiple states flows into the sea on the coastline of Tamil Nadu. The dispute over the distribution of the Cauvery water affects the amount and timing of water released. Any changes in the distribution of the water affects livelihoods of millions of farmers in the state, especially those reliant on the canal water for their water supply.

For the selection of case studies, a map was created of all Kudimaramathu and KAIFA works concerned with tank rehabilitation in the districts Pudukottai and Thanjavur.

Figure 2 Tank rehabilitation works in Pudukottai and Thanjavur

Tank rehabilitation works in Pudukottai and Thanjavur



(Source: Author)

For Kudimaramathu, all works done in the districts in 2019-2020 are displayed while, all KAIFA works are shown since its establishment. Two case studies were chosen. The first is Kalathur village, where the Kaaduvaakulam tank was rehabilitated through the Kudimaramathu scheme. The second case study is Anavayal village, where the Vettukulam tank was rehabilitated by the local youth group with support of KAIFA. The villages are 13 kilometers apart and are highlighted on the map below. First the Kudimaramathu scheme will be explained followed by the Kalathur case study. Then the socially embedded organization, KAIFA, will be introduced followed by the case study of Anavayal.

6.1 The Kudimaramathu scheme

In 2017 when Tamil Nadu was heavily affected by droughts, the state announced the Kudimaramathu scheme, aimed at reviving the age old practice of community participation in tank management and rehabilitation (R sakthivadivel and Shah 2018). With the Kudimaramathu scheme, the government of Tamil Nadu attempts to rehabilitate defunct water bodies all over the state, by reviving practices of self-maintenance of tanks by communities. Kudimaramathu works for tanks are under control of the PWD. Only tanks of 40 acres or more are eligible for Kudimaramathu, while smaller tanks are under panchayat control. The Kudimaramathu scheme follows a selection process in which a limited amount of tanks are selected every year. However, this process of selection is not fully clear (R sakthivadivel and Shah 2018). Selection can happen either through a request from farmers during monthly grievance meetings at their respective districts or by a government official. The Engineering Chief (EC) is asked by the Secretary of water resources to prepare a list of works for rehabilitation. The EC puts this request forward to Regional Chief Engineers, who turn to their field officers. Those field officers, or Assistant Engineers (AE) make their judgement based on tank state and local factors of politics and power. The selection is passed up the ladder and then discussed with the Secretary and Ministers who finalize the list of selected tanks, taking into account the representation in that list of most tank districts (M. Shah and Sakthivadivel 2018). After a location gets selected the panchayat head, who handles the schemes within his area will get notified. Because many WUA's have

gone defunct an irrigation committee has to be set up, in which only farmers who are landholders can be a member. The irrigation committee will be part of decision-making for the project and will disband when the works are completed. Beneficiaries have to contribute 10 percent of the cost either in cash or labor and the other 90 percent is covered by the scheme fund. Sakthivadivel and Shah (2018) argue the scheme brings unity among villagers and increased storage capacity of tanks has been used to aid to a variety of problems. So far, the project was considered a success in places where the focus was on the felt need of the community. However, in many cases the implementation of the scheme was executed top down and the communities contribute only little, leading to WUAs becoming defunct and only little ownership of the tank is being felt by its community.

6.2 Previous case studies

A journalist who published a now deleted series of articles (Joseph 2020) on agriculture in Tamil Nadu, carried out case studies on Kudimaramathu works. He argued the pressure on water resources is caused by population growth, and a simultaneous growth of cultivation. In combination with the rise of groundwater pumping and an individual 'free for all' approach.

One of his case studies he carried out in Dindigul, located inland, south east of Pudukottai, where he studied a rainfed tank that was rehabilitated through Kudimaramathu in 2017. A very large tank of around 16,000 acres. The tank, which traditionally was a wetland used for irrigation purposes, had dried up. When it was selected for Kudimaramathu works a portion of the lakebed was dug up and encroachments were removed. A sign was put up, some photos were taken, and the works concluded. The works in this tank were deemed successful and heralded for their success at that time.

The journalist studied this location in 2020 and found the tank had dried up once more. It was being used for drinking water alone. The panchayat president had undertaken action and constructed pipelines. Pumping water to the tank from a nearby river, a few kilometers away. There were six borewells in the middle of the lake that went 800 to 900 feet deep and in those borewells there was no water. Those borewells would be

alternated using a motor pump and that water was driven into a well, which was then used for drinking water for the villagers. The tank was not functional as an irrigation structure, propolis juliflora had returned in the lakebed and the farmers had to deal with water scarcity. The journalist argues the Kudimaramathu works in Dindigul were futile and argues one of the reasons is the changed rainfall patterns which caused the water supply to tanks to change. Arguing that even when works are done properly, there is no use when there is no rain.

“There’s no there’s no water because one there is a change in rainfall pattern. Okay, and the other is groundwaters usage has changed drastically.”

“Even when the work is undertaken properly the change in the rainfall pattern basically means that is of no use, right.” (Interview Journalist 2020)

The second cause he observed is the dramatic rise in groundwater use due to government provided electricity, leading to dropping groundwater tables and individualistic approach to water access. Free electricity has given farmers incentive to continuously deepen their borewells because running the borewell is free.

“this individualistic approach that has set in, Okay, yeah, like, if you are my neighbour and I have more money, I will dig deeper, I can gain more access to water. And the thing here is that whoever has water is rich, or richer, comparatively? So that the competition is always there”.

“when you look at it as hydrologically, you’re losing out every year because there is not sufficient rain in this region.”

Then there is the process of the Kudimaramathu works itself. The journalist observed poor participation and inclusion of stakeholders. Although a WUA was present in the area some people were not included in the decision-making process of the works. Sometimes large landholders are excluded from WUA’s or farmers are not even aware that there is a project in which they are stakeholders. Similar claims are made by Shah and Sakthivadivel (2018) who argue that attempts of the government to mobilize farmers have failed and many WUA’s are defunct or poorly included in decision making.

“there’s water usage associations. I mean, it’s present in technical terms. Okay, like in paper it will be present. Yeah. But the people around these structures may not even be part of it.”

He notes socioeconomic aspects of caste and politics come into play. Arguing that people of lower caste have lesser control assets and thus have little voice in these processes. He is convinced Kudimaramathu would be more efficient in places where people have equal positions in the community.

“That particular village or settlement in the vicinity was a scheduled caste. Group. Yeah. Okay, so this is like for them. And that is where the politics and things of it comes into picture. There are dominant groups, and there are no people who belong to the lower caste. Yeah, who don't have much control assets.”

“Yeah, like this for this would have been much more efficient in areas where the people who are stakeholders, they are an equal position in the community. Like when I said the scheduled caste settlement was kept away from the decision making?”

Then there is the role of the government in selection of the works, allocation of money and evaluation. According to the journalist some works are selected for questionable reasons and make no sense to locals.

“Yeah. And out of those, the lake which was selected was the lowest down (Downstream). Okay. Now, the people are saying that there's no point in renovating this lake without renovating all the other six lakes, okay, because by the time you get water here, all the other lakes would have been filled up, like and Tamil Nadu would be having sufficient water. Yeah. So what is the point there?”

After completion of the works there is the aspect of evaluation of completed works. According to the journalist evaluation of the scheme is just based on money spent. A certain amount of money is allocated for the scheme as a whole and then spread among selected works. Those works are carried out, billed and then evaluated only based on completion and the amount of money spent. Meaning that criteria of the scheme can be met without actually fulfilling the purpose. Farmers question the sustainability of the implemented work and worry about lack of maintenance of the tank (M. Shah and Sakthivadivel 2018) . Then there are the accusations of corruption where works are billed for amounts that do not match the actual work that was done. Or instances where works that were billed without ever physically being done. The journalist, although not knowing for sure, had suspicions of money not being used for the things that they were intended for.

“How much money was allocated. Yeah, that is essentially all that matters like in terms of 100 crores allocated for that and so on. So scheme and if 85 crores are being utilised, yeah. And then this many lakes, which have renovated that it is just number numbers. These numbers can be, you know, kind of made up in the sense that you can actually meet the criteria without actually doing anything”

“People are saying work has been done, but nothing is being done. Now. Yeah. No, another lake which I came across this again in Dindigul. This was also like a huge lake. And all the works were done also pretty decently.... And you think about the amount that has been spent, it doesn't match. This is what they are saying. This is, irrespective of the fact that this is a pointless exercise, as long as there is no rain.”

Altogether the journalist argues that Kudimaramathu is an exercise in futility. Arguing that many works fail due to improper participation and inclusion, corruption, poor evaluation and maintenance. Even when works are done properly, changed rainfall patterns cause them to be of little use. He could see participation and inclusion in the works being more efficient when there is equality amongst stakeholders. The next part of this chapter will explore another case study of Kudimaramathu works.

6.3 Kalathur village case study

This first case study was undertaken in Kalathur village, part of Pattukottai Taluk, and Thanjavur District. The tank by the name of Kaaduvaakulam was renovated following the Kudimaramathu scheme.

The Kaaduvaakulam tank covers an area of 60 to 65 acres, owing its water supply to the Agniyar/Grand Anicut Canal, making it a tank under the control of the Public Works Department. The tank is located in the tail end of the Cauvery basin and is fed by a small channel branched of the Grand Anicut canal that carries the water for some distance. This channel flows along the Panchayat Presidents house and some coconut plantations first before reaching the tank. Farmers along this channel are able to take water from this channel before it actually reaches the tank.

The village itself is located just southeast of the tank. There live around 700 to 800 families in the village, a total population of 1275 according to the 2011 Population Census

(Ministry of Home Affairs 2011). 400-500 of the families belong to the Thevar⁹ community. All landowners around the tank are from this community. They have marriage alliances with eleven other villages in the area, with Thevar people alone, creating a very interconnected community. Around 25 families are from the Chettiyar¹⁰ community and 10 more are from the Pandaram community¹¹. 200 families are of Scheduled Castes, who do not own land and can not use the irrigation facilities. Because of the small size of the village, most people know each other, especially people of the Thevar community.

There is not much migration into the village but many of the younger generation people migrate to nearby cities or abroad, for work. Most of the people occupied in agriculture are of the previous generation, around the age of 50. Besides agricultural occupations in the village there are some families who are occupied as washermen or fishermen, who use the tank to wash clothes and do fishing. Furthermore, there is a high school located in the village where education can be followed up to the age of 15. The village has some coffee/teashops, restaurants, small stores and a hotel, mostly located nearby the Kalathur busstop. There is also the panchayat office where village decisions are made, taxes are paid and complaints can be admitted. On the shore of the tank there is a temple, which has a small tank pond next to it. The temple festival is celebrated here. There is also a village comity who take care of these expenses and hosting this celebration. This is a separate comity with which the panchayat president is not concerned.

The main use of the tank is irrigation, according to local farmers irrigating almost 300 acres of farmland, benefiting approximately 100 farmers around the lake. Most of the are small farmers with two to three acres of farming land but among them are three or four large farmers who own ten or more acres of land. Historically the tank was used as the main source for irrigation, there were only few borewells and the tank provided

⁹ A group of communities native to Southern India, also known as the Mukkulathor people. Consists of three other communities who claim to be descendents of South Indian dynasties.

¹⁰ A community native to the Chettinad region in Tamil nadu

¹¹ A community that consists of temple priests

sufficient water. Two farmers mention the tank is only used for irrigation. When asked for other purposes, they acknowledge there are different uses as well. The main use being irrigation and secondly for watering cattle. The water is not clean enough for drinking but it is used for bathing and washing clothes. Cattle will drink water in the supply channel of the tank. People from nearby villages will also come to the tank and make use of it. The tank is also a place for meeting and recreation, mostly in the corner nearby the village.

Tanks in surrounding villages are dry in summer while Kaaduvaakulam will have water. There is no restriction for people to come and bath in the tank, or water cattle, anyone can come and go. A farmer notes that other villages have such restrictions on the use of the tank, but they do not. After being asked if there are restriction he answered:

“Nothing like that. During Gaja cyclone this tank only had water. There was no water in surrounding areas. All came and bathed here. Bathing, washing clothes, giving water to cattle. Washer men from nearby villages also will wash here. No one will tell anything.” (Fieldwork day 2 interview 1 2020)

Some restrictions are mentioned for irrigation, based on caste and if someone owns land. Local families belonging to the Scheduled Caste community (SC) can make use of the tank but are not allowed to do so for irrigation. The reason told is that they do not own land and thus are excluded from use for irrigation.

The tank is also used to grow fish, which are caught by fishermen during the Tamil month Chithirai and Vaigasi (April and May). Fishing rights will be distributed through an auction which is held by the union. Part of the earnings of selling the tender will go to the village and those funds are then used for village expenses.

Previous generations used to only cultivate, whereas now, the area is known for its plantations. Depending on the water availability farmers usually cultivate two seasons of paddy in a year. When sufficient water is available two seasons will be cultivated and otherwise only one crop. Most farmers cultivate paddy and or coconut. Whereas the coconut plantations are situated around the tank, all the paddy fields are located directly south of the tank to make irrigation of the water intensive crops more practical as the area is sloped down towards the paddy. The distribution of water through weirs in the tanks is controlled by the farmers themselves. Cultivation of coconut is more

profitable than paddy. However, farmers still grow paddy in separate lands for their own use because buying it from stores is not affordable for them.

A local farmer explains the choice for cultivating paddy:

“we can eat three meals a day, but we cannot get any income or profit by cultivating paddy. I am also a farmer, agriculture is done only for the purpose of not letting go of agriculture and for our prestige”(Fieldwork day 1 interview 2 2020)

Figure 3 Paddy field (left) next to Kaaduvaakulam tank



(Source: Ashoka Trust fieldwork team)

Coconut trees take some years to grow before being profitable, making farmers struggle the first years, but then grow to be more profitable than paddy. Coconut also requires less water for irrigation. The cyclone Gaja, in 2018 destroyed many of the plantations. And even though it would take some years, farmers started cultivating coconut once again, for its profit.

Water availability is unpredictable as the tank is situated in the tail end of the Cauvery and only the remaining water will reach this area. Both the timing and amount of water differ, depending on the release from upstream dams¹². The past two or three years they received timely water and sufficient rain, but this is never guaranteed. Most farmers are

¹² The flow of water in the Cauvery river depends on the release of upstream dams. The largest dam in Tamil Nadu is the Mettur dam, which is depended for water on its own catchment and release of upstream dams in the state Karnataka. The distribution of the limited available water causes the continuous conflict between the state.

dependent on the supply of canal water and storage in the tank. One farmer argues the storage of water in lakes like Kaaduvakulam is essential for sustaining agriculture in the area. He explains, in the past they would be able to cultivate three seasons, saying two crops is also sufficient to sustain livelihoods. However insufficient supply water sometimes only allows them to only cultivate one crop.

“If this water supply stops, then they will stop this cultivation and go for other works. The people who have bores, they will continue.” (Fieldwork day 1 interview 1 2020)

Farmers who have access to borewell will be able to cultivate two or three seasons of crop. Droughts from 2016 to 2018 limited agriculture to those owning borewell. However only few farmers in the village own a borewell and they cultivate around 5 acres of land. When asked why others do not have borewell the farmer replies:

“They are not having that much land. There should be at least five acres. There is not that much land. Many are having 1 acre only.”

The borewells are powered by the free electricity supplied by the government. Those who own a borewell will share water if there is sufficient water available. Farmers will share excess water:

“we won’t say no to those who ask water. If its excess for us, then we will tell”

“We won’t get money for water”

“We are not charging. Government gives current free for us. Water is given by God”

“We will give others after irrigating our land. If we have water scarcity, we will tell them not to do farming as we can’t take water. This season we could give. But we can’t during summer months like May, June.”(Fieldwork day 3 interview 1 2020)

The rise of groundwater use impacted groundwater tables in the area as well as the tank management. Earlier, borewells would find water at depths of 100 to 130 feet, but when use increased those levels went to 260 feet leading to borewell failure and having to deepend the wells. The increase also caused the tanks to start going unnoticed around 2005 and people stopped caring about the water management.

6.3.1 The local youth group

The bad state of water resources and water bodies was noticed and incentivized local youth to focus on improving those resources. The local youth group, by the name of Uyirthuli fought for renovation of the local tank. The group consists of around a 100 'youngsters' (20-40 years old), who are all educated and many work in the oil and gas industries¹³. Their motivation to unite in an organization is that together they can get things done.

“Similarly, the youth in all villages come together and do something like this because and individual human being, cannot do anything here.” (Fieldwork day 1 interview 2 2020)

The Uyirthuli organization originates from the 2017 Neduvasal protest. The government announced a project for hydrocarbon extraction, affecting many places around the nation. Among which was Neduvasal, a village in Pudukottai district. Youth from Kalathur united in the protest against hydrocarbon extraction, of which they have knowledge through their own work. Their main motivation was to secure and protect livelihoods in the area for current and future generations, to which the hydrocarbon extraction would be a threat. The shared objective made them overcome caste, religion and political differences according to one member. The protest was a boost to form an organization of likeminded youngsters who wanted to do something for the village. As the organization's main aim was securing agricultural livelihoods in the area, they also spoke out on the topic of water resources in the region, saying something had to be done to improve them. This resulted in the organization focusing on the Kalathur tank, Kaaduvakulam. Encroachments had been growing in the tank for years. Encroachments are the results of people undertaking activities such as farming in the tank area, limiting its storage capacity. The group argued that the water resources in the tank were insufficient and argued something had to be done. Combined with recent droughts, farmers' livelihoods, dependent on tank water were threatened.

¹³ Many educated youngsters in the area work abroad in oil and gas industries, in the Gulf countries and Singapore

Figure 4 The Kaaduvaakulam tank



(Source: Google Earth)

The encroachment in the tank reduced its acreage by 27 acres which were mostly located in the northern part of the tank, identifiable as the light square patches of land on the picture. The tank had shrunk a lot and 43 people took part in the encroachments. With a map of the tank from 60 years back and supported by the PWD and the team members, that consist of a lawyer, doctor and engineer, fought the case. The group used “patta” to gain acquire a decision in their favor. The patta is a legal document issued by the government which establishes the ownership over a piece of land. In the end the high court ordered the removal of encroachments after measurements. They used markings on coconut trees and roads to clarify the boundaries of the tank to overcome future encroachments. They funded the activities by selling the silt from the lake and raised money among themselves. They spread the word with banners and consulted

farmers. An amount of three to four lakhs (a lakh is 100,000) rupees (3400 to 4500 euro's) was spent. The group faced conflicts with other stakeholders during this process.

“We faced a lot of problems while removing the encroachments on the lake. The women of the village took the broom and came to the street and fought.” (Fieldwork day 1 interview 2 2020, 1)

According to a member of the Uyirthuli organization the main opposition to their objective were the Panchayat president and some large landholders, resulting in a large conflict between the opposing sides. The encroached lands belonged mostly to the panchayat president and a big landowner. The conflict also caused friction in families in which father and son were on opposing sides of the debate. People who had occupied the land within the lake would get angry at hearing the name ‘Uyirthuli’, for they felt the consequences of the removal of encroachments.

6.3.2 The Kudimaramathu works

The Kaaduvakulam tank was adopted and rejuvenated through the Kudimaramathu scheme in 2020. The works completed through the Kudimaramathu scheme include, strengthening the bund, the reconstruction of sluices, construction of a weir, supply channel and irrigation channel. The Uyirthuli group, although focusing on the improvement of the local water sources was not included in the Kudimaramathu project for their tank. According to group members, control and decision making of the project came into the hands of local politicians, mostly the Panchayat president who appointed a relative as the irrigation committee head.

“We (Uyirthuli) got this project from the government and then it went into the hands of the local political people. Currently it is not in the hands of the people who fought for it.” (Fieldwork day 1 interview 2 2020)

The farmers in Kalathur did not approach the government for the scheme but the tank was directly selected by government officials. After selection an irrigation committee should be set up in which irrigators and beneficiaries will be the members. The word of the tank being selected for Kudimaramathu ended up with the panchayat president first, as the president handles all the schemes. The president made a big landowner, head of the irrigation committee. Furthermore, only farmers are in the irrigation committee and

70% of the farmers in the area are said to be a member. The only prerequisite is having land in the area, meaning other stakeholders such as cattle owners or washers are not included. This is because of a rule in the scheme that the funds can only be used by irrigators/farmers. As for the Kalathur case decision making for the project was done by four people, not including the other irrigation committee members. A farmer and member of the irrigation committee and Uyirthuli argues the following on the decision making of the irrigation committee.

“Members in Irrigation committee have the mentality that they are the whole village and they are from Thevar community. They only have the ability to rule the village and what they are saying will be the rules. But Uyir Thuli was not like that. They said that everyone could.”(Fieldwork day 3 interview 1 2020)

During the process of the works, the AE will select works to be done and calculates the cost of which 10% of the total cost has to be contributed by the farmers themselves. The government does not supply the money upfront so the works have to be funded by the stakeholders first after which they can claim the bill at the government. This makes collecting the needed money a difficult task as most farmers cannot afford to put in money.

“We should have economical support. All those who are having land, we won’t have money” (Fieldwork day 2 interview 1 2020)

In the case of Kaaduvaakulam both the panchayat president and the village committee chairman supplied money to cover the cost and then claimed the money at the government. The panchayat president contributed although he did not use the irrigation facilities of the tank. According to observations of the fieldwork team his motives for contributing could be political and financial gain. For the rejuvenation a total amount of 77 Lakhs was spend. During the works the AE monitored the works for quality. The irrigation committee head will create the bill, send it to the AE and then it will be paid by the government.

After completion of the works, a sign will be put up, showing the works have been completed. A picture will be taken with some key people and the sign and then the project ends. No further evaluation is carried out.

Figure 5 Completion sign Kaaduvaakulam tank



(Source: Ashoka Trust fieldwork team)

6.3.3 Rehabilitation outcomes and reactions

After the works a rise of the groundwater levels is observed. A member of the youth group credits the efforts of Uyirthuli for the increased groundwater levels. A farmer and member of the irrigation committee notes a change in water use after the works, and the collective motivation and involvement to secure the availability of water.

“This year we are using water wisely so that we will have water in the tank next year”

“You know that we should store water. How are you teaching this to other farmers?”

“All are involved in this. They are doing this in an interest, so that if they desilt it, water will be increased in the tank. They could use it for agriculture.” (Fieldwork day 2 interview 1 2020)

After being asked on their opinions on the Kudimaramathu scheme, there are mixed responses. The irrigation committee head, who was appointed by the panchayat president argues the scheme was very useful.

“The scheme given by the government is very useful. The government has given this scheme only after researching. Its value is very high, water can be stored.” (Fieldwork day 2 interview 3 2020)

Another member of the irrigation committee, who was one of the encroachers fought by Uyirthuli also argues for its usefulness.

“This is a good plan only. By this only, we could build the tank.”(Fieldwork day 2 interview 1 2020)

While a member of Uyirthuli said the following:

“This is a good thing. However, it is not implementing properly in the field, because of local politics. Some farmers, who might be in politics and government officials will also share the funds allocated in the scheme.”(Fieldwork day 1 interview 1 2020, 1)

Another member of Uyirthuli mentions there is corruption during the process of the scheme also saying that nothing is done against corruption. He argues that, if works have been completed and bills paid no attention will be paid to it.

“They told that they did as per engineer’s plan. With that they showed the expenditure amount for 77 lakhs. The work was finished, and they showed their usage quotation for materials like 20000 rupees for gravel when the actual amount is 10000 rupees.”

“So, he will clearly brainwash them that if they get materials for 30 lakhs, then they will mention it as 50 lakhs. Give quotation like that. They will clearly attach the papers to be given to the government. So that when government see the account, it will be clearly valued as 77 lakhs. Second thing is no one will dig up this matter. Great levels like CBI or Crime branch won’t get involved in this. They will be like if you take photo after completion of work, then it’s okay.”

In Uyir Thuli, if they cooperate us well we will support. In 77 lakhs we knew about the scam. They are from our village only. My brother also worked for this. If there is fund from Uyir Thuli, they are using it properly. If they ask them to desilt for the next step they are doing it properly. Proverb (Thaen edukravan viral sappuvaan). If their scam is low and they worked properly, Uyir Thuli will definitely support them” (Fieldwork day 3 interview 1 2020)

To which he adds that if there is only little corruption during the implementation of the scheme, Uyirthuli would cooperate with the works. Members of the youth group are aware of these activities but show some degree of acceptance if it is for the good of the tank. They are willing to cooperate with other parties if there is only little corruption. Similarly, to what the journalist found in case studies there are allegations of corruption

and poor participation of stakeholders. The works are completed but no evaluation takes place.

6.4 The KAIFA organization

The Kadaimadai Integrated Farmers Association (KAIFA) originated from the 2018 Gaja cyclone. Just like the Uyirthuli organization, the founders of KAIFA were first inspired by the Neduvasal protest where the farmers united and voiced their opinion and realized the possibility for social activism when uniting. Mr. Ram Kumar, one of KAIFA's founder's name's Uyirthuli and the fact that they were active very nearby as an important influence.

“Uyirthuli is an organization, which is only within the Kalathur village, which is a nearby village. Before that, everyone belonged to a simple village and doing their own jobs. But when happened after that was, it influenced many, because when something happens, so, nearby to you, it automatically starts influencing you just like that it got started influencing everyone around very next year during 2019 January.” (Fieldwork day 6 interview 1 2020)

Ultimately the cyclone was the event that led to KAIFA being established. During the cyclone almost 90% of coconut trees were destroyed and many farmers lost their source of income. As formerly mentioned, the area is hugely dependent on coconut cultivation for income. As many livelihoods were destroyed by the loss of coconut trees, many people thought of leaving their towns to go for other professions in different places which motivated the founders to strive to create a better situation in the area. An Indian expat, who worked in Singapore at that time but was in his home area for vacation, quit his job. The first day after the cyclone, he and his associates started the initiative BounceBackDelta through which they carried out relief works in the area. He is currently a prominent member of KAIFA. They quickly gained recognition on radio and social media and many people started supporting them. They first started relief works in surrounding villages, clearing roads, clearing fallen trees from houses, restoring electricity and spreading relief materials. They didn't plan for anything yet as there was no established team, but they organized all their activities through their network and contacts. They realized many things could be achieved when working as a team. With a few key people they formed Kadaimadai Integrated Farmers Association. Among the

key people in forming were, a movie producer and social activist who was very active during the Neduvasal protest, who would become the president to the organization. They wanted the organization to represent the area and its population. Kadai Madai means tail end in Tamil, as they were located in the tail end of the Cauvery reach, near the sea. An organization representing farmers, helping and educating them while also forming a collective body to represent themselves and the area to the government. The former president notes that what enabled them to coordinate their efforts, was their close proximity.

“Everything is like a single small area. We used to travel like traveling to a neighbour house. All the areas are very nearby.”

They decided that everything in the organization should be democratic with the consultation of public opinions and transparency on decision-making and funding. As an association they even have bylaws and a set of rules and consequences to structure the organization.

“We even have bylaws also. Since it is an association, (that is Sangam in Tamil). It's a kind of farmers Association. That kind of bylaws is essential for registering.”

“If somebody misses those rules and regulations, do you have any kind of penalty? Also if somebody misuses or did not follow?”

“The people who are in the post, they should step down. In that case, if a member does something wrong, they should be taken out from the Association.”

In deciding the focus of the organization, they saw the largest threat to farmers was a lack of water.

“We have heard from our family, that we used to get water at 30, 40 feet here. Now we are digging bores for 300, 400feet and even 1000 feet, 1500 feet also. When we think that why the situation is like this!”

Water bodies were not maintained properly, and they had to deal with the yearly struggle over water distribution with neighboring state, Karnataka. With the deteriorated water bodies, the released water from canals would flow to the sea instead of stored in tanks. The team knew they wanted to do tank rejuvenation and were inspired by another nearby initiative. An independent team did desilting works of tanks in their village, and KAIFA met with their leader who shared his knowledge with them, which then formed a major motivation.

The team decided to focus on the maintenance and rejuvenation of water bodies. They discussed among themselves and the village elders and chose the Periya Kulam (big tank/lake) in Peravurani, as their first project. The large tank spans 564 acres and benefits around 200,000 people in the area. They consulted with all the stakeholders in the area, and many people told them that what they were doing was impossible and would bring shame if they weren't able to complete the works. But they believed in their good cause and confident in their team. They started the works with an amount of 20,000 rupees which they collected through a subscription system through which people could become a member of KAIFA either on a yearly or lifetime basis. Many people contributed from their personal funds which helped them to do the works. The works were completed in 107 days and during the 60th day of work, they first received Cauvery water in the tank, which fully filled the tank on the 110th day. They cleared 4 kilometers of supply channels leading up to the tank, which had turned into a dumping place in the years before. They also set boundaries in the supply channel, planted a grasslike plant that prevents soil erosion and created a small forest on an island within the tank. The group had not received government financial support until here but when they approached them also received support from the PWD and district collector. The total amount spent now is 27 lakhs. After the works were completed, people in the area started noticing the difference.

“During one day, a random farmer who was going somewhere came forward to us and told that water is now at 45, 50 feet. Just think that, this is a difference happened in 6 months.”

The word of their success spread and KAIFA started doing the rejuvenation works in other places. Today they have done tank rejuvenation in 57 lakes, all in the area surrounding Peravurani, limiting themselves to the Pudukottai and Thanjavur district as these were places with which they were already familiar.

“The area you are mentioning like Pudukottai and Thanjavur district will come under probably a radius of 20,30 kilometers only. All these areas are like already kind of explored area to us previously. But now also through some contacts only we have done some work.”

They haven't developed in other regions so far, with only little members outside of Pudukottai. The former president notes that expanding the organisation is a slow and difficult process. Currently rehabilitation works happen mostly within the existing networks of the organization or when they are asked by villagers such as in the Annavayal case.

"We need Connections. See everything depends upon the connections."

Their networks and interconnectedness in the area is of great importance, drawing both inspiration from people in the area or using family relations to start rejuvenation works. When asked on their relation with Kalathur village and Uyirthuli, the former president of KAIFA answers:

"We have so many relatives there and my wife even she's from Kalathur. My sister also we have married her there. My brother also we have taken a bride from Kalathur."

The current president of KAIFA, is named as a key person in the effectiveness of the organization. Showing that individuals actors and their networks aid the development of the organization.

"In that case, the president is a very key person, for the Peravurani Periyakulam lake. He is a native of Neduvasal but settled in Peravurani. They have settled there, since when he was a kid, he was one of the key person in that. He knows all persons, people on the political front and also the local front, like the business people, small vendors and government people as well. You see, he's a connector, huge connector in it and also is a key person. So, because of that everything happened very fast."

This also helps them in working with local politics and power as well. When working on tanks the organization often need permission from authorities to do the works. The PWD must give permission and also supply maps of the tanks to the organization. Here political challenges come in to play. Sometimes authorities will try to slowdown or prevent works.

"First, they will try to postpone those things. When we are working as a team, it has its own advantage."

However, their networks have also gained them support that make their work easier. A local dairy company supported KAIFA through a corporate social responsibility program (CSR). Up until then, KAIFA rented excavators to do the works which costed a lot of money. The CEO of Milky Mist agreed to supply them with the most important machine, effectively limiting their operating costs, which also supported the project in the case study in the following part of this chapter. The JCB supplied by KAIFA made the rejuvenation of other tanks possible, limiting the costs to diesel, wage and food. In addition, KAIFA set up a crowdfunding campaign after the cyclone which got a great response. They collected almost 30 lakh, which is a huge amount. A part of this success is attributed to social media to spread the message. Around 20-30 percent was contributed by foreign donators. Many people working in Gulf countries donated money to their cause. The donated money was a huge boost for them. They valued transparency and started sharing daily expenditure updates on WhatsApp and social media. Lastly, they gain members and funds through the membership system KAIFA has adopted. They require villagers who apply for tank rejuvenation to become a member of KAIFA either on an annual or lifetime basis. An annual membership costs 200 rupees and a lifetime membership costs 2500 rupees. Members must be farmers and live within the four taluks where they are active. Initially there were 22 members and which has grown to over 100 members. This highlights the growth of the organization in the area and the rising amount of rehabilitation works, among which the following case study.

6.5 Annavayal village case study

The Vettukulam tank, located in Anavayal was rehabilitated by the local youth group, Jeeva Nagar, with the support of KAIFA, in 2020. Anavayal village is part of Thiruvarankulam taluk, part of Pudukottai district. The distance from here to the location of the Kalathur case is around 13 kilometers, a 30-minute ride by car. The tank covers an area of around 50 acres and is under panchayat control because its rainfed. The tank benefits around 150 families in the area. There used to be only around 30 families in the area, but it has grown in recent decades. Most families are from Most

Backward Classes (MBC) communities, of which Servar and Muthiraiyar¹⁴ are the majority. A smaller portion of the community is from Chettiar¹⁵, Scheduled Caste and Backward Classes communities. They all live together in the village, there is no separation between communities. The village has few drink shops but little further facilities. The village does not have a Panchayat office or the panchayat president residing in the village. Anavayal is part of seven villages which together constitute Anavayal panchayat, but the panchayat decision making is not being done here. The main decision making in the village is done at the Pidariyathal temple. The temple is an important meeting place to incentivize people to attend discussions and decision making besides its religious function. All communities will come to this temple but the SC and Chettiar people will also have a separate temple. They use all temples but prefer those based on their community customs.

As for the tank itself, the main uses of the are percolation, bathing, daily routine and watering cattle. Its use for irrigation of farmlands is only small. Percolation is the main to restore groundwater levels. Farmers irrigate their field with borewells situated to the north. They use long pipes to redirect the water towards their fields. Pipes will be mostly covered by sand and occasionally will lie above ground. Digging the borewells within the fields is not efficient according to the farmers, thus they dig them further away from the fields. The farmers share the borewell water among themselves and do not mind pipes crossing their lands.

Agriculture in Anavayal is characterized by smallholder farmers who cultivate between half and one and a half acres of land. The main crops grown by farmers in the area are, paddy, coconut, maize, and some small intercrops (rows of small crops alternated with a larger crop such as coconut). Depending on the soil they can cultivate different crops. Coconut for example cannot be cultivated in clay like soil, which is better suited for paddy. Most farmers cultivate three crops a year. Paddy once and then some small other crops.

¹⁴ Native communities to Southern India. Primarily work in agriculture, as traders and fishermen.

¹⁵ A title used by traders, weaving, agricultural and land owning castes in Tamil Nadu

Figure 6 The Vettukulam tank



(Source: Google Earth)

The Vettukulam tank, literally meaning excavated lake, was made a long time back by the villagers of Annavayal, although they are not exactly sure when. When it was built the main use of the tank was for bathing, daily routine, and watering cattle. Irrigation of the farmlands with the tank water was only a secondary purpose and in current times is barely possible due to lack of water. In contrast to the Kudaavaakulam tank, Vettukulam is a rainfed tank, meaning that it is supplied by rainwater. The district of Pudukottai is not connected to the Cauvery canals and thus, does not receive canal water. Only in the case of leakage or excess water, will water be directed to the tanks in the area. During the time of kings in Pudukottai, when the Grand Anicut canal was constructed, the king of Pudukottai said the district had sufficient water supply, resulting in the canal not being connected to the water bodies in the district. Although very nearby, the people of Pudukottai do not have access to the Grand Anicut canal waters. Rainfall used to be predictable making the tank the most important structure for water. To maintain its functionality villagers used to regularly desilt the tank. Previous

generations also planted date palm trees to prevent erosion of the soil in the tank, also functioning as boundaries of the tank and preventing encroachment. The palm trees can also withstand droughts and cyclonic activity. When there is water in the soil the bottom part of the trunk of these trees will become enlarged, through which villagers will know there is water at six feet in the soil. This enables villagers to measure the water level without being able to see it. The tree has shallow roots and uses little water, therefore having only little impact on the water supply in the tank. The trees function as a historical management structure to maintain the tank and its boundaries.

As years went by the tank started to lose its functionality for multiple reasons. Months that were known for their monsoon rains started to fail to deliver water. A farmer explains there used to be rains but the Tamil month by the name of Aiyyasi has dried up. People started using borewells to pump groundwater for irrigation, leading to the deterioration of tank management.

“The previous generation had desilted. Now only all people started using bore and pump. Previously people used tanks and lakes only. Those people used it. As the days go by people left it and they forgot it. They stopped desilting the tank.”

The past 20 years there were no desilting works in the tank leading to its deterioration. Lack of desilting works made the tank lose its storage capacity. In recent years there were sand encroachments in the tank and Proposis Juliflora trees started growing in the tank. Proposis Juliflora is a bushlike tree with deep roots, spreading very fast. In the current situation farmers are dependent on borewells for water and the tank has only little importance. There are around ten borewells in the outer area around the tank. From the bores, pipes direct the water to the fields. Those who do not own borewell can use the tank for irrigation although there is only little water. The benefits of the tank are shared equally but some importance is given to those farmers who are more dependent on the tank for water.

“This is desilted for people only. Farmers could also use who don’t have bore water. For all the times, they have to do farming. Farmers are dependent on farmlands only. It is useful not only to them but also to everyone. We gave importance to those who don’t have bore facility. Those who do farming for their daily income, we gave importance to them.”(Fieldwork day 5 interview 1 2020)

When there is sufficient rainfall, the villagers will direct the tankwater to the lands, making sure it can pass the farmlands, also reaching the lands situated further away. According to a 26-year-old farmer and member of the Jeeva Nagar group, who also works in a dairy company, argues water is equally shared and this happens without conflict.

“All are taking equal benefits. There is no partiality. They are taking equality while using this. When there is heavy rainfall and there is water in the farmlands, we will break out the tanks. We could use it when needed.”

“There won’t be any problem. For the farms which are too far, water can’t reach it directly. It should pass every farm land. So, whenever they announce, there would be rain, everyone will break it. So that water will be filled in one by one and reach here. After the rain, they will stop the level according to their wish..” (Fieldwork day 5 interview 1 2020)

The farmer explains that, when there are heavy rains they breakout the tank and barriers, so the water can run freely to all the fields, including the ones further away, which will receive water from adjacent fields. Then when farmers perceive they have sufficient water, they will close them up again. But as the supply of water has been decreasing, farmers ability to cultivate multiple seasons of crops is also limited. Farmers used to be able to cultivate two seasons of crops, but most farmers are now limited to only one crop. The wealthier people who have access to sufficient water will still cultivate two crops. The increased use of borewell has also affected aquifers. Water used to be found at around 100 to 150 feet but the groundwater table has decreased dramatically. The farmer explains borewells used to be kept at 150 feet, but they had to be deepened due to the falling groundwater table.

“Initially it was 150 feet. Now it has gone up to 1200 feet. It has gone too deep. Water is at 300 feet depth.” (Fieldwork day 4 interview 2 2020)

The depth where water is found also affects its qualities. Water from 1000 feet is hot and needs to be cooled before it can be used for drinking. While water from 300 feet will be tasty, water from 600 feet will be tasteless and hot. It can be used for irrigation. Mr. Pradeesh names the decreased groundwater table as the reason for the desilting works

“We felt that the water level was reduced, before 4 years. There was a decrease in bore well of all people. We felt that, whether we are using it or not, we have to save the ground water level. For that reason, we are desilting in every area.” (Fieldwork day 5 interview 1 2020)

Figure 7 The Vettukulam tank before desilting works



(Source: Ashoka Trust fieldwork team)

6.5.1 The local youth group

Because of the changing rainfall patterns and increased groundwater use the tank had fallen into deterioration. Decreased groundwater tables and continuous pressure on water sources led to the reappraisal of the usefulness of the tank for percolation and irrigation. This resulted in the Vettukulam tank being rejuvenated in 2020 by the local youth group, by the name of Jeeva Nagar, in collaboration with KAIFA. Their main objective is to restore its storage capacity and use for percolation to refill aquifers. First, they want to increase the groundwater level before using the surfacewater in the tank. They were motivated by the ambition to secure a better future for the next generation, arguing that something needs to be done. The farmers carry pride in being a farmer and were taught by their parents and they want to make sure the tank is useful for the next generation of farmers.

“They didn’t do for themselves or us. They are having a kid. Their kids shouldn’t stand deserted at some point without water. They shouldn’t be without agriculture. They shouldn’t be without way for food. So, everyone helped with this thought.”

“Will you have profit if you plant one crop season only?”

“We are not doing this in profit mentality. We are not doing for family also. This is my father’s occupation. We are doing this for generations. Our father’s feet and

grandfather's feet will be touched in this land. That is our soul's satisfaction. We are standing in a land where our ancestors stood. When we grow our food and eat, we will be having certain happiness. We are giving food to others also, inspite of we ourselves eating. It will give extra happiness. Nothing more than that."(Fieldwork day 4 interview 2 2020)

Among the farmers that were interviewed there was a strong sense of responsibility for the future of the area and the tank. Arguing that the future of the area is in their own hands and only they can make it better. They took matters into their own hands, noting that they cannot rely on the government for help, saying that government help is only possible after complex formalities.

"The future is in our hands only."

"Naturally, rainfall is on one side. We have to store that. If we do that, then we can have groundwater. If not, it won't be there."

"If we do it through government, we have to go and stand there. Everyone have their work. Instead of going and asking government, it is our tank. Why can't we do it for our village!"(Fieldwork day 5 interview 2 2020)

The Jeeva Nagar group first gathered villagers by using the local temple called Pidari Amman Kovil. The temple and its coinciding Neem tree are said to be of importance for people joining this gathering. Here they first spread the word of their plans to rejuvenate the tank. Youngsters from all families which also gained the group the support of those families. The number of members the group has is unclear. While one member says there are 30-40 members another says there are 70 to 80 members. A farmer argues all castes are included, gathering all youngsters without exclusion. Noting that the tank is common to all villagers of Annavayal and therefore caste should not matter.

All members are equals and no head was selected, arguing that would cause problems. One member acknowledges some leadership was needed, so they included four adults.

"It was created by youngsters only. There should be some leadership, so we included those four adults. But in reality, there is no leader. All are equal."(Fieldwork day 5 interview 1 2020)

As the older members were born before the youth, they are said to have better knowledge of the situation in the past. They would share their knowledge, inspiring decision-making in the group. Another reason for including them because the older members often receive more credibility when they want to make plans and apply for

subsidies. The group uses WhatsApp for communication. Through daily updates they spread information on the progress and expenses. One member of the group mentions everyone would be involved in decision making and they used a car and microphone to announce meetings. Weekly talks would be held to discuss the progress of works.

“All would be involved. If we have to talk about this, every people in village would gather and talk what we did and what should be done.”

“We have used an auto. With the help of mic, we will announce. If not, youngsters would walk to every house and tell that we are going to talk about the tank. It would be okay, if one person per home comes or one youngster per home comes. Give your opinion in this. We would tell like this and call them. There will be both positive and negative opinions. We can't take everything. If 50 people gives negative opinion and 100 gives positive opinions. We can't talk for those 50 negative opinions. 100 people will try to change the negative opinion. If we rectify, what they told negative. They won't tell negative comments the next time.” (Fieldwork day 5 interview 1 2020)

6.5.2 The rehabilitation works

For separate tasks, the group selected a few members to carry out the activities such as collecting the funds. One member of the group introduced them to KAIFA, another voluntary organization concerned with rejuvenation of tanks in the area. KAIFA agreed to help them in their efforts. The group planned desilting works for the tank, for which KAIFA supplied a JCB excavator to help with the works. Removing and selling silt from a tank requires government permission, but the group spread the silt on the banks of the tank to heighten the bunds, to avoid conflict with the government but make use of the silt, nonetheless. They also planned to build a small forest inside the lake to attract rains, birds and other animals. They were inspired by a similar forest within a tank in Peravurani, which was also rejuvenated by KAIFA. As there were trees around the lake already, they left this plan and instead planned to plant extra saplings along the sides, providing shade and strength to the soil. To water the saplings and trees in summer the villagers used the government initiated MGNREGA scheme which provides 100 workdays to every household, therewith using the government scheme to provide both work and maintenance of the tank. During the time of the tank renovation, the youth group requested villagers to clear the culverts and pipes around their homes, to create

better flow towards the tank. In addition, they asked farmers to clear the eucalyptus trees nearby the tank. These are nonnative water intensive trees used to make paper. The owners agreed to remove the trees after the next harvest.

In total the works took around 20 days to complete during which weekly updates were provided to the villagers. According to the people interviewed, the works were completed in harmony, without conflict. The physical outcomes of the works are not yet clear because of how recent they were carried out.

Compared to Kalathur, in this case local leadership played no significant role. The farmers do tell that the minister of environment and climate change that was recently chosen during the recent elections, is from the constituency to which Anavayal belongs. The farmers explained that they might approach him in the future to ask for rehabilitation of the supply channels. Showing the importance of political power in such cases.

Figure 8 Vettukulam tank after rehabilitation works



(source: Ashoka Trust fieldwork team)

The total expenses for the works were around 1 ½ lakhs, which is relatively little compared to the case of Kalathur. Because KAIFA provided the JCB excavator, the villagers only had to pay for diesel expenses of the machine and wage and food for the person operating it. The funds for the works were collected by cutting down and selling

the Proposis Juliflora trees, which provided around one lakh. The government did not allow the cutting of the Proposis Juliflora but the youngsters did so anyway.

“Government is telling not to cut the trees. But we did it for the goodness of our village. We talked about it in Panchayat. We asked them that we won’t waste that cut down trees. We asked them what should be done. We told them that we would use it for this and we will produce the bill for this as well. We gave them the details about how much weight and the bill for that. We have that attached with the bill for how much we sold it and how much money we used.” (Fieldwork day 5 interview 1 2020)

Although the government did not allow for selling the trees, they did receive support of the panchayat and went on anyway. The panchayat head contributed to the works by donating nearly 30.000 rupees. When asked why the panchayat head joined their cause the farmer and member of Jeeva Nagar responded the following:

“The head person also joined here in compulsion. He feared that they might turn against him in politics.”

“He thought that he should also join. If he is not a part in this it would be projected wrong.” (Fieldwork day 4 interview 2 2020)

The remainder of the costs was covered by the villagers and some wealthy people. Local households and farmers could contribute money but were not forced to do so. The Covid pandemic left many people without income and depending on their funds would contribute small amounts. Some of the funds were also contributed through remittances, one farmers son contributed by sending 1000 rupees from Singapore, where he works.

To gain the support from KAIFA, 10 members of Jeeva Nagar joined KAIFA in the form of a one-year membership, costing 500 rupees per head. After completing the works the group the collaboration with KAIFA ended. They do plan to clear the supply channel that leads up to the tank in the future. However, they only had limited funds and chose to prioritize works within the tank. When asked if there will be any future collaboration with KAIFA one member replies the following:

“Hereafter we should not disturb the voluntary organization. They won’t volunteer. They will be having many villages like us. They can’t be doing for the same village. We shouldn’t expect also. We should fulfil our own needs. If we expect the government also we can’t get.”

“If you ask help they will help?”

“If we ask, they will do. But there is no chance to get the whole help. They will do what they can. The rest should be done by us.” (Fieldwork day 4 interview 2 2020)

The villagers and especially the youth portray a strong sense of responsibility for the future of the village. They plan for future rehabilitation works for the tank. Although they are grateful for the support KAIFA has provided, they feel that they should not expect future support from either KAIFA or the government. They see the needs of other villages and recognize they should fulfil their own needs.

Chapter 7 - Conclusion

This final chapter seeks to discuss the implications of the presented findings in to the chosen concepts, informing and contributing to them. First the implications of my findings will be discussed, finished by the answering of the research question and recommendations.

7.1 Discussion

Central to this study is the concept of institutional bricolage (Clever 2002; Koning 2011). During this study local youth groups were observed, highlighting them as bricoleurs in changing local settings with multiple identities, united in socially embedded organisations. Simultaneously the Tamil Nadu government, much more a bureaucratic institution attempts to renew institutional arrangements through the Kudimaramathu scheme which was introduced and adapted within the institutional plurality that exists in local settings. The commons situations that result from this interplay is beyond what new institutional economy can envision. A great mix of uses, actors, practices, traditional & modern, socially embedded & bureaucratic arrangements that through social struggle shape and transform tank realities.

7.1.1 The motivation of multiple identities

The results of this study highlighted how multiple identities of actors (See also, Cleaver 2002) in tank settings influenced their use of tanks, their practices, and how they mobilize resources and arrangements through these identities.

Firstly, both case studies in this thesis showed the presence of several youth groups who are part of the social worlds surrounding tank arrangements and started behaving as new tank institutions. Many of the youth involved are well educated and work in industries in cities or abroad. When only highlighting productive identities, which institutional theory tends to do (Clever 2002), the interest of these youth groups in tanks is hard to explain. However, when highlighting their multiple identities as having roots in the region, being “activists” and “familymembers”, their connection to

the local tanks is explained. The youth groups act from the motivation of wanting to do something for the village and securing the livelihoods and identity of the region. This motivation results in the organizations pursuing multiple purposes.

For example, the Uyirthuli organisation was first established in response to the threat of hydrocarbon extraction which would possibly cause destruction to the region. KAIFA, was first established after Gaja cyclone. Later their purpose changed to creating a platform to represent the area and its farmers. Some key people with varying roles and identities, such as film producer and social activist were included as members and further shaped its development. They shifted their purpose to improving the performance of water resources in the area. During their development, the organization has been mobilizing other material and immaterial resources with the help of their networks to aid in their work such as crowdfunding and acquiring resources through a CSR program with a local company. In the process they borrow arrangements from other domains to legitimize the organisation, such as making, 'being democratic', 'consulting public opinions' and 'transparency of funding and decisionmaking' central pillars to their work (Douglas 1986). Altogether this has turned the movement into a mix of socially embedded and bureaucratic elements (Cleaver 2002).

7.1.2 Beyond subtractive and non-subtractive uses

The previous paragraph presented how multiple identities of actors in tank settings shape their use of the resource. The results in this study further explained how the use and users of resources can solely be classified in classical divisions. In literature, tank – or water – use is often divided in subtractive uses such as “irrigation” and non-subtractive uses such as “bathing” (Edwards and Steins 1998). This study however shows that here exist nontangible uses or purposes that play a role within tank settings and create a complex and diverse arena of users and their claims to waters, which are important to be recognized within institutional analysis and development. Youth of the various youth groups presented a strong sense of pride and responsibility to secure a better future for the region, wanting to achieve this through the traditional tank structures. Most members of the groups are themselves not physical users of the water in the tanks (Meinzen-Dick 2001). Their use of water is different and stems from

ideological and cultural aspects. They see water as a means to secure the future livelihoods and identity of the area. They use this motivation and ideas of this being ‘the right thing to do’ and investment in, to legitimize their claim (or right) to have a voice about the water (see also Boelens and Doornbos 2001) and alter tanks (rules) even though they do themselves not subtract from the tanks’ waters.

Similarly, farmers who could be identified as “irrigators”, (driven by rational choice in institutional theory, and who are making their choices towards optimal resource use) are seen to have different, more cultural motivations behind their use of tanks. A strong sense of pride and prestige is felt by some of those who practice agriculture. Not using the tank just for its water but for the purpose of not letting go, to secure an identity of traditional ways and heritage (see also Mosse 1997).

7.1.3 Fluid rights to water

Local tanks are at the centre of a wide network of uses and practices, of which members and activities are not always clearly defined. Rights to use are seen to be fluid under varying circumstances.

While the use of fishing is regulated through yearly auctions held by the Panchayat Union other subtractive and non-subtractive uses such as bathing, watering cattle, washing clothes and leisure are not regulated. The tank in the first case study is the only one in the area that contains water during summer and thus attract people from surrounding villages who are permitted without restrictions, for uses such as bathing and washing. The same was the case after the 2018 cyclone when in the area only this tank contained water. The common experience of hardship during this time was used to justify the sharing of water among people who normally were not seen as legitimized users of this tank. From the perspective mainstream institutionalism the application of clear boundaries to the use of tank water is required (E. Ostrom 1993), but in practice norms and values from other domains or crises such as Gaja cyclone stretch the boundaries of legitimized users in these commons situations.

Furthermore water rights in tank settings and the studied rehabilitation created, negotiated, and consolidated through social struggle, in which various social aspects and relationships of power define the arena in which water rights take form (see also

Meinzen-Dick 2001). Actors express their agency within the boundaries of what is seen as legitimized and actively transform these boundaries by mobilizing various resources and arrangements.

Within tank settings, physical boundaries of tank structure itself define part of the right to water and are seen to be negotiated and transformed. In a conflict over the boundaries of the tank the local youth group deployed the “patta” to acquire a court ruling in their favour. The group selected rules and procedures from different normative systems to legitimize their claims (See also, Von Benda-Beckmann, K von Benda-Beckmann, and Spiertz 1998; Meinzen-Dick 2001). Interestingly in the second case, physical boundaries were sanctioned through a historical institution. Date palm trees were planted by previous generations that form the boundaries to the tank.

As for social regulation of access, in both case irrigation water was not distributed through formalized institutions. In Kalathur farmers are said to take equal benefits and stop using water when they have sufficient. Excess groundwater is shared among farmers and with those who don't own borewell. Other are not charged as the electricity is provided by the government and water is said to be received by god:

*“We are not charging. Government gives current free for us. Water is given by god.”
(Fieldwork day 3 interview 1 2020)*

Without formalized institutions farmers have arrangements for the distribution of the available water based mutual understanding and the symbolic origin of water. There are however aspects that create inequality in access to water rights. Some farmers are privileged because of certain situations for example in Anavayal:

“Farmers could also use who don't have bore water... We gave importance to those who don't have bore facility. Those who do farming for their daily income, we gave importance to them.” (Fieldwork day 5 interview 1 2020)

Values from other domains are borrowed and adapted in local institutions through leakage of meaning (see also, Douglas 1986), in this case giving privileges to those who have greater dependence on the resource to sustain their livelihood. Whereas in Kalathur farmers are excluded based on caste or not having landholdings.

7.1.4 The new tank institutions

The Kudimaramathu scheme considers only landholding farmers to be part of the decision-making process of its works. It attempts mixing historical institutional arrangements through involvement of community participation and mixing them with modern arrangements. In WUA's only landholding farmers can be a member. Most of these WUA's in the area have gone defunct and are replaced by Irrigation Committee's, that in practice have similar requirements for being a member. The scheme has a uniform design for the rehabilitation projects which is highly unlikely to represent all users and livelihood interests (Cleaver and de Koning 2015) and is flawed for its sole focus on landholding farmers, excluding other users (see also Meinzen-Dick 2001). The introduction of these formalized institutions is followed by a process of aggregation, alteration and articulation (Koning 2011) through power relations among actors. The project was shown to be shaped by local leadership in which many stakeholders were excluded. Similar processes were observed in the local adaptation of Kudimaramathu works by Shah and Sakthivadivel (2018) and one of the interviewees (Interview Journalist 2020).

The Anavayal rehabilitation project derived from socially embedded movements, groups who were already connected to the local setting and adjusted the process to this setting. The group appropriated different institutional elements to shape the rehabilitation process. The temple was used as a local institution from religious domain, carrying authority, and incentivizing people to attend meetings; 'age' is believed to carry authority, was mobilized to provide more credibility to the youth group; and 'kinship' was mobilized to gain the support of whole families when one family member joined the group. Decisions were made based on the majority opinion and their perception of doing the right thing. In both cases the dominant focus was on the involvement of farmers possibly overlooking other uses. The Anavayal case showed greater informing of villagers, but both case studies would profit if decision making was informed by tank users for better overall equity and productivity of the resource (see also Meinzen-Dick 2001).

7.1.5 Expressing agency within structural constraints

Government policies outside Kudimaramathu were observed as shaping some of the processes in tank settings and rehabilitation projects. The government provides both accessible credit to dig borewells and free electricity to run them (Fujita 2011). In combination with the MSP on wheat crops this created accessible groundwater for irrigation and incentivized to cultivate subsidized crops and (over)exploitation of groundwater. Then there are regulations on the removal and sale of silt from tank beds and wood from Proposis Juliflora trees which could both be used to fund works. Actors face structural constraint but also express agency in these situations. Against government orders the Anavayal youth group sold the wood from the removed Proposis trees, their motivation being that it would be for the good of the village. Lastly the MGNREGA scheme was mobilized by the group to maintain some of the works in the tank. The scheme provided labor to the tank to water the tree saplings, which function as boundaries and against soil degradation, during summer.

7.1.6 The fruits and the futility

After the completion of the tank rehabilitation in the first case study some changes were observed by its stakeholders. Farmers perceived a rise in groundwater which one of them attributes to the earlier efforts of the youth group who fought the encroachments. The rise of water in the tank is attributed to the Kudimaramathu works and farmers also have plans for the future of the tank.

“Yes, through Kudimaramathu there is water in Kalathur tank... If we desilt it in the next year we could store more water.” (Fieldwork day 2 interview 1 2020)

The farmer also mentions that water in the tank is being used wisely by its users this year, being motivated by the opportunity to keep water for the next year. Also showing future plans to further improve the tank storage capacity.

“This year we are using water wisely so that we will have water in the tank next year”

Possibly this has led to greater productive sustainability of the resource, through greater percolation and storage capacity. However, the long-term effects on sustainability are

difficult to define. In addition, as per Kudimaramathu policy, the irrigation committee disbands after completion of the work and evaluation of the works is only based on the amount of money spent. Lack of evaluation impairs Kudimaramathu ability to develop over time and disbanding the irrigation committee lacks focus on enduring institutions. Equity in this project in relation to its users was poor for its inclusion of only landholding farmers, and relations of power among subjects. In Anavayal, the youth group is still active after the rehabilitation project and planning to do future rehabilitation in the tank. The effect of their works to achieve better storage capacity and percolation into aquifers remains unclear. Actors in Anavayal mentioned changed and unpredictable rainfall patterns, similarly to what is reported in previous case studies (Interview Journalist 2020), where such rehabilitation efforts were argued futile. This makes me question the effectiveness of this project for the productive sustainability of the resource. The possible futility of these interventions raises the question if the answer of securing the future livelihoods of the people in this region lies in tanks at all. What their efforts possibly did achieve is greater ecological sustainability through their focus on biodiversity and inclusion of villagers in the process. What both cases did highlight is that tanks are of great importance in their localities and that they incentivize both government and socially embedded movements to act to transform them with the purpose of sustainability. The tank initiatives from local groups exist alongside the government scheme, but although having similar goals, did not mix well in the first case study. The various youth groups in these case studies showed similar characteristics and motivations. Many are well educated, some live in cities or abroad but yet, show great interest in the region and especially its water resources. They are eager to protect the agricultural identity of the region and securing a better future. Even if not all tanks are part of the solution to the regions water stressed situation, what is present, is a young, educated generation who feel responsible for the region and are eager to grab opportunities and a large government scheme which both strive for a sustainable Cauvery Delta. This brings me to the conclusion of my thesis, answering my research question and discussing recommendations.

7.2 Conclusion

This research aimed to identify how the future sustainable and equitable management of tank CPRs is shaped by rehabilitation schemes of both bureaucratic and socially embedded institutions. Based on literature study, expert interviews, and the qualitative analysis of two case studies, it can be concluded that the effect of the introduction of bureaucratic and socially embedded institutions on sustainability and equitability in tank settings is mixed.

I found, in the first case, the government scheme is flawed for its uniform design and poor participation. Sustainability regarding the productive use of the resource is questionable for its lack of focus on enduring institutions. This conclusion is supported by previous research and experts (R sakthivadivel and Shah 2018; Interview Journalist 2020). However, physical, and social changes were observed as the result of this rehabilitation scheme. The notion of changed use of the resource among users does point to the establishment of new institutional arrangements regarding expected behaviour for the use of the resource. This study could not observe if these changes endure over time.

Socially embedded organizations are naturally more closely connected with the local settings. In the second case study they mobilized institutions and arrangements to facilitate participation of all potential stakeholders. However, from their motivation of the doing the “right thing for the future”, these organizations could similarly gloss over current inequalities in water rights. The sustainability of the productive use of the resource is questionable based on the biophysical conditions of the resource having changed. The organizations’ motivation focusing heavily on the future does however point to the potential enduringness of these institutions. I found that the government scheme and schemes from socially embedded organizations exist alongside each other but don’t mix well in practice. Government tank rehabilitation could potentially benefit from the integration of socially embedded organizations in which these organizations form the bridge between policy and local tank settings. This could lead to better adaptation of projects on the ground and overall better results.

Using the theoretical framework of institutional bricolage, multiple-use systems, and water rights, I have outlined how multiple identities and underlying motivations shape subtractive, non-subtractive but also less tangible uses, embedded in ideological and cultural identities. Local tank settings are characterized by a continuous social struggle for water rights in which material and immaterial resources and arrangements are mobilized to legitimize rights to water. The introduction of new institutions in complex settings, be it bureaucratic, socially embedded or a mix thereof, do not necessarily lead to sustainable and equitable commons. Institutions are altered and adapted in local settings through relationships of power among subjects, creating both intended and unintended outcomes.

I argue for the inclusion of multiple uses and the consideration of ideological and cultural identities that underpin claims for non-subtractive rights to water, to inform institutional analysis, through the method of institutional bricolage. This would support comprehensive analysis of institutional arrangements in CPR settings, towards better adjusted policies. This study pointed out that methods for analysis of CPR settings should be continuously adapted to diversity and complexity which is at the heart of critical institutionalism.

The methodology of qualitative analysis and a small number of case studies limited the generalizability of the findings of this study. The conclusions are limited to the studied cases but do present leads for wider application in tank settings in the region. The theoretical findings can inform institutional analysis in CPR settings.

Through the methodology case studies were carefully selected based on pre-defined characteristics to fit the research question and facilitate comparison. However, after the fieldwork concluded I found that findings would have benefited from better sampling towards the population of tank settings. This could have been done partly before and during fieldwork. The methodology did result in rich descriptive data to answer the research question but would have further benefited from rigorous operationalization of concepts to create more concise data. The inclusion of quantitative data to support findings was pursued but turned out fruitless.

The study did provide extensive insights on two cases. This has both social implications and theoretical implications for future institutional analysis of CPRs. Using this theory and results, future research should focus on the different identities of stakeholders that inform their claim to water rights, to gain more comprehensive insight in the arena in which institutional arrangements are formed and transformed. This would involve a central focus on the stakeholders and their various identities, before analysing how they affect institutional arrangements. The goal would be to uncover driving forces behind stakeholders' efforts to change institutional arrangements and water rights. Furthermore, institutional arrangements such as government policies which are not directly related to the specific setting should be analysed for both their structuring and enabling role in CPR settings. This study identified the role of various policies, which were beyond its scope, but did affect the local setting. Future studies should incorporate such elements in analysis to show the reach of such policies. Together, this would contribute to the field of studies and the diverse settings it investigates.

Although I do not believe in panaceas for institutional design, I do believe, continuous research on CPRs and their institutional arrangements can facilitate better adjusted policies towards sustainable and equitable institutions in CPR settings.

References

- Aarnoudse, E., A. Closas, and N. Lefore. 2018. 'Water User Associations: A Review of Approaches and Alternative Management Options for Sub-Saharan Africa'. International Water Management Institute (IWMI). <https://doi.org/10.5337/2018.210>.
- Agrawal, Arun. 2014. 'Studying the Commons, Governing Common-Pool Resource Outcomes: Some Concluding Thoughts'. *Environmental Science & Policy* 36 (February): 86–91. <https://doi.org/10.1016/j.envsci.2013.08.012>.
- Araral, Eduardo. 2014. 'Ostrom, Hardin and the Commons: A Critical Appreciation and a Revisionist View'. *Environmental Science & Policy* 36 (February): 11–23. <https://doi.org/10.1016/j.envsci.2013.07.011>.
- Aubriot, Prabhakar. 2011. 'Water Institutions and the "Revival" of Tanks in South India: What Is at Stake Locally?' *Water Alternatives* 4 (3): 22.
- Bandopadhyay, Arun. 2009. 'Agrarian Change and Social Mobility in Colonial Conditions: The Mirasi Question in Nineteenth Century Tamil Nadu'. *Indian Historical Review* 36 (2): 237–56. <https://doi.org/10.1177/037698360903600203>.
- Bisung, Elijah, Susan J. Elliott, Corinne J. Schuster-Wallace, Diana M. Karanja, and Abudho Bernard. 2014. 'Social Capital, Collective Action and Access to Water in Rural Kenya'. *Social Science & Medicine* 119 (October): 147–54. <https://doi.org/10.1016/j.socscimed.2014.07.060>.
- Boeijs, Hennie, and Inge Bleijenbergh. 2019. *Analyseren in kwalitatief onderzoek: denken en doen*. Amsterdam: Boom.
- Boelens, Rutgerd. 2008. 'Water Rights Arenas in the Andes: Upscaling Networks to Strengthen Local Water Control'. *Water Alternatives* 1 (1): 18.
- Boelens, Rutgerd, and Bernita Doornbos. 2001. 'The Battlefield of Water Rights: Rule Making amidst Conflicting Normative Frameworks in the Ecuadorian Highlands'. *Human Organization*, 343–55.
- Bolin, Inge. 1990. 'Upsetting the Power Balance: Cooperation, Competition, and Conflict along an Andean Irrigation System'. *Human Organization*, 140–48.
- Cleaver, Frances. 2002. 'Reinventing Institutions: Bricolage and the Social Embeddedness of Natural Resource Management'. *The European Journal of Development Research* 14 (2): 11–30. <https://doi.org/10.1080/714000425>.
- Cleaver, Frances, and Jessica de Koning. 2015. 'Furthering Critical Institutionalism'. *International Journal of the Commons* 9 (March): 18.
- De Koning, Jessica, and Frances Cleaver. 2012. 'Institutional Bricolage in Community Forestry: An Agenda for Future Research'. In *Forest-People Interfaces*, 277–90. Springer.
- 'Department of Food and Public Distribution'. 2021. March 2021. <http://epds.nic.in>.
- Douglas, Mary. 1986. *How Institutions Think*. Syracuse University Press.
- Drèze, Jean, and Reetika Khera. 2017. 'Recent Social Security Initiatives in India'. *World Development* 98 (October): 555–72.
- Edwards, Victoria M., and Nathalie A. Steins. 1998. 'Developing an Analytical Framework for Multiple-Use Commons'. *Journal of Theoretical Politics* 10 (3): 347–83. <https://doi.org/10.1177/0951692898010003008>.

- Feeny, David, Fikret Berkes, Bonnie J. McCay, and James M. Acheson. 1990. 'The Tragedy of the Commons: Twenty-Two Years Later'. *Human Ecology* 18 (1): 1–19. <https://doi.org/10.1007/BF00889070>.
- Ferdin, Marius, Stefan Görlitz, and Steffen Schwörer. 2010. 'Water Stress in the Cauvery Basin, South India — How Current Water Management Approaches and Allocation Conflict Constrain Reform'. *Asien* 117 (October): 18.
- Forsyth, Tim, and Craig Johnson. 2014. 'Elinor Ostrom's Legacy: Governing the Commons and the Rational Choice Controversy: Legacy: Elinor Ostrom'. *Development and Change* 45 (5): 1093–1110. <https://doi.org/10.1111/dech.12110>.
- Fujita, Koichi. 2011. 'Introduction: Socio-Economic Dynamics in a Tank-Irrigated Rural Area in Contemporary Tamil Nadu, India'.
- Hardin, Garret. 1968. 'The Tragedy of the Commons'. *Science* 162 (3859): 1243–48. <https://doi.org/10.1126/science.162.3859.1243>.
- Hennink, Monique M., Inge Hutter, and Ajay Bailey. 2011. *Qualitative Research Methods*. London ; Thousand Oaks, Calif: SAGE.
- Hoogesteger, Jaime, and Philippus Wester. 2015. 'Intensive Groundwater Use and (in)Equity: Processes and Governance Challenges'. *Environmental Science & Policy* 51 (August): 117–24. <https://doi.org/10.1016/j.envsci.2015.04.004>.
- Interview Journalist. 2020.
- Janakarajan, S, and M Moench. 2006. 'Are Wells a Potential Threat to Farmers' Well-Being? Case of Deteriorating Groundwater Irrigation in Tamil Nadu'. *Economic and Political Weekly* 41 (37): 3977–87.
- Jeannette Armstrong. 2003. 'Water Is Siwlkw'. *Water and Cultural Diversity*, 2003.
- Jegadeesan, Muniandi, and FUJITA Koichi. 2011. 'Deterioration of the Informal Tank Institution in Tamil Nadu: Caste-Based Rural Society and Rapid Economic Development in India'. *Southeast Asian Studies* 49 (1): 31.
- Joseph, Jeff. 2020. 'Kudimaramathu, an Excercise in Futility?' *The Lede*, 14 April 2020. <https://www.thelede.in/topic/kudimaramathu>.
- Kemper, K.E. 2007. 'Instruments and Institutions for Groundwater Management'. In *The Agricultural Groundwater Revolution. Opportunities and Threats to Development*, 153–72. Oxfordshire: CABI.
- Koning, Jessica de. 2011. 'Reshaping Institutions: Bricolage Processes in Smallholder Forestry in the Amazon'. Wageningen: [publisher not identified].
- Kulkarni, S.S.A., P Sinha, S.S.M. Belsare, and C Tejawat. 2011. 'Participatory Irrigation Management in India: Achievements, Threats and Opportunities' 68.
- Meinzen-Dick, Ruth. 2001. 'Multiple Uses of Water in Irrigated Areas'. *Irrigation and Drainage Systems* 15: 6.
- Meinzen-Dick, Ruth, and Margaretha Bakker. 1999. 'Irrigation Systems as Multiple-Use Commons: Water Use in Kirindi Oya, Sri Lanka'. *Agriculture and Human Values* 16: 13.
- Merrey, Douglas J, and Simon Cook. 2012. 'Fostering Institutional Creativity at Multiple Levels: Towards Facilitated Institutional Bricolage'. *Water Alternatives* 5 (1): 19.
- Ministry of Home Affairs. 2011. Kalathur Population. 2011. <https://www.census2011.co.in/data/village/595947-kalathur-andhra-pradesh.html>.

- Mosse, David. 1997. 'The Symbolic Making of a Common Property Resource: History, Ecology and Locality in a Tank-irrigated Landscape in South India'. *Development and Change* 28 (3): 467–504.
- Mukherji, Aditi. 2020. 'Sustainable Groundwater Management in India Needs a Water-Energy-Food Nexus Approach'. *Applied Economic Perspectives and Policy*, November, aepp.13123. <https://doi.org/10.1002/aepp.13123>.
- Nambi, A., and Chandra Bahinipati. 2013. 'Adaptation to Climate Change and Livelihoods: An Integrated Case Study to Assess the Vulnerability and Adaptation Options of the Fishing and Farming Communities of Selected East Coast Stretch of Tamil Nadu, India'. *Asian Journal of Environment and Disaster Management (AJEDM) - Focusing on Pro-Active Risk Reduction in Asia* 04 (03): 297–321. <https://doi.org/10.3850/S1793924012001691>.
- Ostrom, Elinor. 1990b. *Governing the Commons: The Evolution of Institutions for Collective Action*. The Political Economy of Institutions and Decisions. Cambridge ; New York: Cambridge University Press.
- . 1990a. *Governing the Commons: The Evolution of Institutions for Collective Action*. The Political Economy of Institutions and Decisions. Cambridge ; New York: Cambridge University Press.
- . 1993. 'Design Principles in Long-Enduring Irrigation Institutions'. *Water Resources Research* 29 (7): 1907–12. <https://doi.org/10.1029/92WR02991>.
- Ostrom, Elinor, Roy Gardner, James Walker, James M Walker, and Jimmy Walker. 1994. *Rules, Games, and Common-Pool Resources*. University of Michigan Press.
- Ostrom, Vincent, and Elinor Ostrom. 1977. 'Public Goods and Public Choices'. In *Alternatives for Delivering Public Services*, 7–49.
- Palanisami, K, and K.W Easter. 1983. 'Department of Agricultural and Applied Economics'. Minnesota: University of Minnesota.
- Pingali, Prabhu, Bhaskar Mittra, and Andaleeb Rahman. 2017. 'The Bumpy Road from Food to Nutrition Security – Slow Evolution of India's Food Policy'. *Global Food Security* 15 (December): 77–84. <https://doi.org/10.1016/j.gfs.2017.05.002>.
- 'Pudukottai District'. 2021. 28 March 2021. <https://pudukkottai.nic.in>.
- R sakthivadivel, and Manisha Shah. 2018. 'Will Kudimaramathu Make Communities Think Tanks Again? A Study of Tanks in Transit, Coping Mechanism of Communities and Government Action'. International Water Management Institute.
- Rajendran, S. 2018. 'Tamil Nadu Revives Kudimaramathu Ancient Wisdom of Water Management'. *Economic and Political Weekly*, 10 February 2018. <https://www.epw.in/journal/2018/6/commentary/tamil-nadu-revives-kudimaramathu.html>.
- Ramachandran, Kanya. 2006. 'The Sacred Spaces of a Water Culture: The Temple Tanks of South India'. Paris: United Nations Educational, Scientific and Cultural Organization.
- Ramaswamy, S. 2007. 'The Groundwater Recharge Movement in India.' In *The Agricultural Groundwater Revolution: Opportunities and Threats to Development*, edited by M. Giordano and K. G. Villholth, 195–210. Wallingford: CABI. <https://doi.org/10.1079/9781845931728.0195>.
- Ramkumar, R. 2019. 'Help Our Farmers to Restore the Reservoirs'. Crowdfunding. Milaap. 2019. <https://milaap.org/fundraisers/help-kaifa>.

- Richards, Alan, and Nirvikar Singh. 2002. 'Inter-State Water Disputes in India: Institutions and Policies'. *International Journal of Water Resources Development* 18 (4): 611–25. <https://doi.org/10.1080/0790062022000017437>.
- Rose, Carol M. 2002. 'Common Property, Regulatory Property, and Environmental Protection: Comparing Community-Based Management to Tradable Environmental Allowances'. *The Drama of the Commons* 233: 250–53.
- Saleth, R. Maria. 2005. 'Water Institutions in India: Structure, Performance, and Change'. In *Water Institutions: Policies, Performance and Prospects*, edited by Chennat Gopalakrishnan, Asit K. Biswas, and Cecilia Tortajada, 47–80. Water Resources Development and Management. Berlin/Heidelberg: Springer-Verlag. https://doi.org/10.1007/3-540-26567-8_3.
- Schlager, Edella. 2007. 'Community Management of Groundwater'. In *The Agricultural Groundwater Revolution. Opportunities and Threats to Development*, 131–52. Oxfordshire: Cabi.
- Schlager, Edella, and Elinor Ostrom. 1999. 'Property Rights Regimes and Coastal Fisheries: An Empirical Analysis'. In *Polycentric Governance and Development*, 87:99–104. Michigan: Ann Arbor: University of Michigan Press.
- Shah, Manisha, and Ramaswamy Sakthivadivel. 2018. 'Will Kudimaramathu Make Communities "Think Tanks" Again?' *International Journal of Engineering*, 6.
- Shah, Tushaar. 2009. 'Climate Change and Groundwater: India's Opportunities for Mitigation and Adaptation'. *Environmental Research Letters* 4 (3): 1–13. <https://doi.org/10.1088/1748-9326/4/3/035005>.
- Smits, Stef, Barbara Van Koppen, Patrick Moriarty, and John Butterworth. 2010. 'Multiple-Use Services as Alternative to Rural Water Supply Services-A Characterisation of the Approach'. *Water Alternatives* 3 (1): 102.
- Tamil Nadu Government. 2000. *The Tamil Nadu Farmers Management of Irrigation Systems Act, 2000*.
- Temple, Bogusia, and Rosalind Edwards. 2002. 'Interpreters/Translators and Cross-Language Research: Reflexivity and Border Crossings'. *International Journal of Qualitative Methods* 1 (2): 1–12. <https://doi.org/10.1177/160940690200100201>.
- 'Thanjavur District'. 2021. 27 March 2021. <https://thanjavur.nic.in>.
- Thiel, Sandra van. 2007. *Research Methods in Public Administration and Public Management: An Introduction*. London: Routledge.
- Von Benda-Beckmann, Franz, K von Benda-Beckmann, and Joep Spiertz. 1998. 'Equity and Legal Pluralism: Taking Customary Law into Account in Natural Resource Policies.' In *Searching for Equity: Conceptions of Justice and Equity in Peasant Irrigation*. Assen: Van Gorcum.
- Yates, Julian S, Leila M Harris, and Nicole J Wilson. 2017. 'Multiple Ontologies of Water: Politics, Conflict and Implications for Governance'. *Environment and Planning D: Society and Space* 35 (5): 797–815. <https://doi.org/10.1177/0263775817700395>.
- Zwarteveen, Margreet, and Ruth Meinzen-Dick. 2001. 'Gender and Property Rights in the Commons: Examples of Water Rights in South Asia'. *Agriculture and Human Values* 18 (1): 11–25.

Annex

1 Data overview

The table below presents an overview of all the primary data in this study:

Name for reference	Type
Fieldwork 3.11.2020 interview 1	Transcript
Fieldwork 3.11.2020 interview 2	Transcript
Fieldwork 4.11.2020 interview 1	Transcript
Fieldwork 4.11.2020 interview 2	Transcript
Fieldwork 4.11.2020 interview 3	Transcript
Fieldwork 5.11.2020 interview 1	Transcript
Fieldwork 6.11.2020 interview 1	Transcript
Fieldwork 6.11.2020 interview 2	Transcript
Fieldwork 7.11.2020 interview 1	Transcript
Fieldwork 7.11.2020 interview 2	Transcript
Fieldwork 8.11.2020 interview 1	Transcript
Interview Student group 26.11.2021	Notes
Fieldwork FGD 1 12.05.2021	Notes
Fieldwork FGD 2 28.05.2021	Notes
Interview Journalist 30.11.2021	Transcripts
Interview KAIFA member 14.01.2021	Notes
Interview Uyirthuli member 1 25.02.2021	Notes
Interview Uyirthuli member 2 26.02.2021	Notes
Monday meetings	Notes
Field reports previous research Atree	Notes
Fieldwork discussions	Notes

2 Fieldwork plan

The objectives of the present study are:

- I. To study **collective action** for the management and maintenance of local irrigation tanks, through **community self-governance, grassroots initiatives** and **government institutions**
- II. To study people's perceptions of tank management and the physical and social diversity of localities in which collective action takes place

Acknowledging the diversity of physical and social contexts surrounding local tanks we aim to measure people's perceptions of tank management in relation to their local context to see how governance can acknowledge and interplay with the diversity of tanks for future governance.

As part of this research is about diversity of tank hydrosocial contexts I need to reach stakeholders of the tanks with different uses for the tank. This could include:

- smallholder farmers
- Larger farmers
- Farmer with and without groundwater access
- Fishermen or fish farmers
- Livestock keepers
- Domestic users
- *Prosopis juliflora* users
- Governments
- Grassroots initiatives
- Others, social users

Most likely farmers will be the majority of users but for a comprehensive view I need reactions of all users. If during fieldwork you encounter additional users, we can readjust and add other users. Is it possible to record a person's location data and the interview itself?

I need interviews with tank users at tanks managed in different ways for comparative analysis. Tanks that have been rehabilitated by governments schemes (Kudimaramathu, TNIAMP/IAMWARM), grassroots initiatives (KAIFA), and possibly tanks that have not been rehabilitated or are defunct in general. Vivek already populated a list with geolocations of the places where KAIFA has been active. I will provide a list of Kudimaramathu (TNIAMP) locations and possibly we can do a more in-depth case study in two places.

2.1 Topic list fieldwork interviews

1. *Tank characteristics*
2. *Personal information*
3. *Collective management*
4. *Grassroots/government interventions*
5. *Hydrosocial context*

Tank characteristics

Tank size estimation

Rainfed/canal fed

Estimation of amount of users

Type of users

Tank functioning/defunct

Type of tank PWD/Panchayat/local

Personal information

Age

Gender

Occupation

Use of tank

Water dependence (tank/dugwell/borewell)

How has water use changed over time (tank>borewell)

Access to borewell (Private/shared/bought)

(Caste?)

Collective management

- *Who are the users of the tank and how is defined who can and cannot use the tank?*
- *Are the benefits (water, land fish) and costs (labour, maintenance, funding) equally shared by the users? How is distribution of the available resources managed?*
- *Do all users who benefit also contribute to the costs of management and maintenance of the resource?*
- *How are you involved in control and management over the tank? (through decision making, rule making)*
- *What institutions are involved in the management of the tank and how? Do users have control and influence over decision-making of these institutions?*
- *How do you perceive the functioning of local institutions involved in tank management? (WUA, Panchayat Union, PWD/WRO)*
- *How has the functioning of the local institutions involved in tank management changed and why?*
- *What rules and sanctions on rule breaking of the rules that are in place for the use of the tank?*
- *How do users and stakeholders communicate and how are conflicts among stakeholders resolved (meetings, whatsapp, etc.)*
- *Are there conflicts related to the management of the tank (distribution, costs, maintenance, users)*
- *How much local autonomy or external interference of institutions is felt in the management of the tank? How do you feel about this?*

Grassroots/government interventions

- *What is the goal of the project?*
- *How is the project arranged and what are the activities?*
- *How was/is awareness of the project spread among stakeholders? (presumably most interesting for grassroots initiatives because they are spread through mediums such as Facebook, twitter and crowdfunding)*
- *Who benefits from the project and how? do all stakeholders benefit from it?*
- *How do local stakeholders contribute to the project (through financing/labour etc.)*
- *How is participation of the local stakeholders arranged? Are they included in decision making, meetings, maintenance, repairs, distribution of benefits, rulemaking?*
- *How is communication arranged between the organisation/government and local stakeholders? (Social media, whatsapp etc.)*
- *Were there any conflicts during the project and how were they resolved?*
- *What are the outcomes of the project for the tank? Did the management of the tank change through the intervention? (Stronger insitutions, sustainable availability and distribution of water?)*
- *Are the activities and outcomes in tune with what you think is needed to improve the functioning of the tank? (attunement between external control and local context and needs)*
- *How do you perceive the future functioning of the tank and how did the project contribute to this? Did the project contribute to the future sustainable management of the tank?*
- *How do you feel about the project in general?*

2.2 Topiclist follow up Fieldwork

- More focus on perceptions, how do stakeholders perceive the impact of the changes. Has it led to new forms of management, changed use, new insights, or collaboration?
 - Access (quantity, quality and timing of water)
 - Livelihoods (improvement of livelihood, additional earnings or supplementary income)
 - Social cohesion (social relations, conflict (resolved), strong institutions, inclusion/exclusion)
 - Political voice (decisionmaking, inclusion in processes, shared voice)
- It is interesting how this young generation seems so motivated to make a change? For this Jeeva Nagar, Mangadu or Uyirthuli organization I would like a very detailed explanation of their origin, motivations and goals, what connects them etc.
 - Origin
 - Motivations
 - Multipurpose
 - Goals
 - What connects them
 - Vision of youth groups on encroachment

- Are government regulations an obstruction to tank rejuvenation?
 - o Electricity subsidies
 - o Desilting limitations
 - o Kudimaramathu requirements
- Village information
- Power inequality
- Funding
- At the Jeeva Nagar tank they plant trees so people can not encroach, can you explain? And what is the point of birds?
- What makes that people want to work together and put in money although not compulsory
- Why is there such specific talk of youngsters in the transcriptions.
- What is the tank management institution in place?
- Law about encroachment

2.3 Themes for observation

Description of daily village life

Village structure

- Roads, housing, waterways, economic activity

Governance

- Individual revenue village or part of group
- Political aspects
- Leadership (panchayat president/board, and other positions)

Tank

- Tank location in relation to the village
- What are the direct surroundings of the tank like?
 - o Vegetation
 - o Farmlands
 - o Roads etc
- Besides irrigation what is the tank used for (social activities, watering cattle etc.)

Population

- Estimate of how many people/households live in the village
- In- and out migration (origin of the population)

Social structure and housing

- Distribution of population among castes
- Relation among people of different castes
- What groups of people are present? (I.E. Jeeva Nagar, Uyirthuli)
- How do they relate to each other?
- Aspects such as marrying alliances, kinship ties
- What is housing like?
- Are there different hamlets?
- Social and physical separation between groups based on socioeconomic factors such as caste or wealth

Economic life and occupations

- Different occupations
- Economic life in the village

Landownership and labour

- Distribution of landowning and non-landowning farmers (relation to social standing)
- Use of hired labour or are the lands worked by landholders themselves

Religious aspects

- Temples and surroundings

3 Code tree

Name	Files	References
External factors	0	0
Covid-19	2	4
Cyclone	5	13
Demography	1	1
Rainfall patterns	5	12
Riverwater	3	4
Technical development	1	3
Government	2	8
Activities	4	5
Corruption conflict	4	12
expectations	2	6
Regulation	6	17
Desilting	2	4
Electricity subsidy	3	4
MGNrega	2	2
Roles	2	2
Collector	1	1
MLA	3	4
Panchayat	2	9
PWD	5	7
Kudimaramathu	4	13
evaluation	2	6
Funding	4	13
Government actor activities	3	10
Irrigation committee	2	8
Local opinions	4	15
Participation inclusion	2	12
Regulation	1	6
Selection process	4	13

Name	Files	References
Works	3	15
WUA	2	4
Local context	2	2
Activities	6	27
age	4	11
Benefits	3	4
Communication	3	11
Conflict and avoidance	6	32
Corruption allegations	2	6
Costs and funding	6	29
decisionmaking	4	15
Future	2	3
identity	1	2
Inclusion	2	7
Local culture and knowledge	5	23
local management regulation	6	51
Motivations inspiration	5	35
Past	6	39
Perceptions	6	17
remittances	2	6
Resource outcome	3	11
Social media instigator	3	9
Socioeconomic factors	6	23
Caste	4	10
Debt	1	4
Political	2	4
Power inequalities	4	11
Wealth	2	3
Stakeholders	1	1
Tank area	6	147
Cropping cultivation	6	26
Encroachment	3	16
Farming activities	1	3
Fishing	3	8
Land distribution	6	12
Occupation	1	1
State	3	12
Tank users uses	6	32
Water	6	25
Borewell groundwater	6	40
Distribution dependency	7	43

Name	Files	References
Drought	2	3
Perception	3	8
Surfacewater	1	4
Trends and changes	5	11
Village roles	5	20
Location info	0	0
Organisations	4	17
Jeeva Nagar	2	26
Activities	1	2
Communication	1	1
Development	1	1
Funding	1	6
Inclusion	2	4
Motivation	2	9
Roles	1	1
KAIFA	3	13
Activities	4	8
Communication	2	3
Decisionmaking	1	3
Development	2	5
Funding	2	6
Location, range	1	3
Membership	3	6
Motivation	1	10
network	1	6
Origin	2	5
regulation	1	1
Roles	2	6
Selection	2	3
Mangadu Youth	1	6
Uyirthuli	3	9
activities	1	1
Motivation	2	3
Objectives	1	1
Origin	1	2
Roles	1	2