Law, technology and water conflicts in developing societies: a case study of tank systems in Tamil Nadu

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ABSTRACT

The study examines the relationship between law, technology and water conflicts from colonial days to the present in traditional (water) tank systems in the south Indian state of Tamil Nadu. Tanks are man-made water systems developed for irrigation and many other purposes in semi-arid areas. The thesis adopts a historical approach to study the development of law, particularly property rights, and takes an empirical approach to investigate the tank conflicts. Archival documents on irrigation development, Case laws, Focus Group Discussions, Open ended Interviews and Field visits to selected tank chains are used as source material for the discussion. Case studies of conflicts are described and analyzed at three levels - Vaigai river basin for a macro level, Kothai *Anicut* system in Cauvery basin for a meso level, and twenty other interconnected tanks for a micro-level.

The thesis deviates from the conventional understanding that tanks as traditional systems as simple and local technologies but considers them to be complex. It argues that the use of commonly held systems such as tanks within the colonial and post colonial laws as state ownership has been the source of many conflicts. In particular, it finds most tank conflicts are a product of progressive and absolute state control over water and the systems established using colonial land revenue administrative law. The law continues to treat tanks as pieces of landed property held by state and the individuals rather than as technology systems that presupposed the regime of property rights introduced after the colonial times. The modern interventions in water including the reservoir building, and altering the hydraulics of rivers and streams aggravate tank conflicts and lead to their further detriment. The study brings the focus to ground realities, and offers new perspectives on understanding tank systems in dynamic ways.

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To my native villages of

V.Chathirapatti, N.Vaiyur and Kitchnaickenpatti

For teaching me about life and water

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For someone like me to have born and grown up in villages of Ramanathapuram and Madurai witnessing water shortages and countless fights for water in tanks and ponds is an everyday reality. As a professional, I preferred to roam around the villages and countryside to repair and rehabilitate tanks and ponds; meet with government functionaries and ordinary villagers to talk about the same issues and problems. These endless discussions with colleagues in DHAN, visitors and scholars to DHAN projects made me to think and reflect about the various problems of tanks. I owe a deep sense of gratitude to all at DHAN who shaped me and my understanding.

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LIST OF ABBREVIATIONS

A.S.No.	Appeal Suit Number
AIR	All India Reporter
Art	Article
BCM	Billion Cubic Metres
BSO	Board Standing Order (also Revenue Standing Order)
cm	Centimetre
CADP	Command Area Development Programme (CADP)
CMP	Civil Miscellaneous Petition
CPC	Civil Procedure Code
CTC	Current Tamil Nadu Cases
CWC	Central Water Commission
CWR	Centre for Water Resources
Cusec	Cubic foot per second
Cumec	Cubic metre per second
DHAN	Development of Human Action Foundation
FAO	Food and Agricultural Organisation
G.O	Government Order
GBP	Great Britain Pounds (also Pound sterling)
GoTN	Government of Tamil Nadu
CSE	Centre for Science and Environment
ha	Hectare
HP	Horse Power
IAMWARM	Irrigated Agriculture Modernization and Water-Bodies Restoration and Management Project
IMT	Irrigation Management Transfer
IMTI	Irrigation Management Training Institute

IWS	Institute of Water Studies
km	Kilometre
LPA	Letters Patent Appeal
LW	Law Weekly
m	Metre
Cum	Cubic metre
Mcft	Million cubic feet
MCM	Million Cubic Metre
MIDS	Madras Institute of Development Studies
Mha	Million hectare
MLA	Member of Legislative Assembly
MLD	Million litres per day
MLJ	Madras Law Journal
MLW	Madras Law Weekly
MP	Member of Parliament
NGO	Non government Organisation
O.S.No	Original Suit Number
PIL	Public Interest Litigation
PIM	Participatory Irrigation Management
PWD	Public Works Department
ROI	Return on Investment
Rs	Rupees
RSO	Revenue Standing Order (also Board Standing Order)
SCC	Supreme Court Cases
SCR	Season and Crop Report
sq.km	Square kilometre
TaFF	Tank Farmers Federation

TFA	Tank Farmers Association
TMcft	Thousand Million cubic feet
TNEB	Tamil Nadu Electricity Board
TSA	Tamil Nadu State Archives
TWAD	Tamil Nadu Water Supply and Drainage Board
UDR	Update Register (of Village Revenue Records)
USD	United State Dollars
V	Versus
VAO	Village Administrative Officer
W.P	Writ Petition
WRO	Water Resources Organisation
WRO-PWD	Water Resources Organisation – Public Works Department
WUA	Water Users Association

DECLARATION

I declare that all the material contained in this thesis is my own work.

1. LAW, TECHNOLOGY AND WATER CONFLICTS IN TANKS: AN INTRODUCTION

1.1 WATER CONFLICTS IN TANK SYSTEMS

Water conflicts are as old as civilizations[1]. Globally, there are several ongoing conflicts between nation states with transnational rivers and lakes. Some have argued that some of the ongoing civil and ethnic strife in parts of Africa[2] and Asia[3] has its roots in water conflicts. In large federal countries like India where there are long rivers spanning more than one state there are inter-state water conflicts (Guhan 1993; Iyer 1994; Singh 2002; D'Souza 2006). Globally, many studies have demonstrated water shortages and competition among different uses such as agriculture, industry etc., as one of the main and fundamental reasons for conflicts (Falkenmark and Widstrand 1980; Maass 1978). International databases on conflicts do show a similar trend and issues across the world[4]. At the end user level in every kind of water systems there are several types of conflicts. Recent case studies across India indicating its seriousness have claimed 'million revolts in the making'. Joy *et.al* (2009) have identified six broad themes in water conflicts within India: contending water uses; equity, access and allocation conflicts around

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[1]References to water conflicts are found in many ancient texts including the Mahabharat, and The Bible. Hammurabi's code has provisions to deal with offenses related to agricultural water systems of the ancient Babylon (*The Code of Hammurabi*, s.55; s56; s259; s260). Vishnugupta's Arthasastra even established a superintendent to deal with water related offenses and fixed the fines for offenses related to abuse of water. See the translation of (Shamasastry 1915, 214)

[2] BBC News. Q&A: Sudan's Darfur conflict. Available at http://news.bbc.co.uk/1/hi/world/africa/ 3496731.stm [Accessed 07 January 2014].

[3] See Selby (2003) for conflicts between Israel and Syria, Palestine and Jordan from Jordan river and its catchments.

[4] Water Conflict Chronology List, A database of various conflicts around the world is available in an interactive format at http://www.worldwater.org/conflict/list/ [Accessed 09 august 2013].

water quality; sand mining; micro-level disputes; dams and displacement; trans-boundary water conflict and privatization (Joy et al. 2009).

In tankfed areas of India, especially the state of Tamil Nadu, water conflicts are not new phenomena but have recurred since the days of the colonial rule. Mosse provides a list of tank conflicts that were dealt by the courts during colonial times,

> Litigation over the dynamics of tank catchments concerned a variety of matters, including inter alia; the intercepting of surplus water flow to downstream tanks through the extension of tank bunds; the creation of new overflow tanks; the extension of channels or the construction of regulating weirs; the cross damming of rivers to take off supply to tank channels; the obstruction or diversion of supply channels; the raising of ridges on dry land in the tank catchment to retain water and prevent its flow to tanks; the turning of tank water to dry land; and the construction of roads or railway lines with drains and culverts which changed the drainage in significant ways (2003, 105).

Even today, such conflicts are common and they are visible manifestations reflecting the status of tensions these systems and the dependent people undergo. They are on the rise, expressed in oral disputes, quarrels and fisticuffs among neighbors; violence between villages/villagers; protests over government action/inaction over tanks and rivers; and rise of court actions. Many such conflicts go beyond[5] the often cited simple water disputes and become a threat to the co-existence of communities.

Generally, the tank water conflict is what happens when the interests of some individuals or of communities become antagonistic, and they are in conflict for controlling the tank and its other uses. Though tank water users are sociable, they do oppose one another, both violently and non-violently at times when there is a conflict. This may take the form of appropriating water into their tanks and channels, or to their fields, or to dispose off the excess water from their tank

[5]Case studies in chapter VIII and IX offer examples of conflicts related to tank usufructs like silt, sand, trees, fishery, tank spaces, and many other issues.

during the floods, or for the fishery and forestry obtained from tanks. (DHAN Foundation 2002a).

1.2 THE STUDY

This research develops an analytical framework to understand tank systems and tank conflicts. Given the disciplinary focus of existing tank studies discussed further on in chapter 3, it becomes necessary to ground an analytical framework on the material realities concerning tanks. This is to prepare the ground for more nuanced theorising. The analytical framework developed in this research seeks to set up the premises for more nuanced theorising on tanks in the future. Without reflecting on how disciplinary orientations have distorted our understanding of tanks (as discussed in section 3.5), I argue, attempts to theorise tanks will fall into the same contradictions and limitations that informs present literature. My focus on tank conflicts rather than tanks as an artifact, a subject that is not addressed adequately in the literature. I argue focus on ground realities will offer new perspectives on understanding tank systems in dynamic ways.

The study is about developing a holistic understanding of water conflicts in tank systems. Based on my own investigations for this research, conflicts in tank areas are of two categories - conflicts for water (direct water conflicts) and conflicts over land spaces and other benefits of the tank. I consider tanks as a socially and economically constructed infrastructure sustained over several centuries, still functioning and holding scope for the future. The research treats tanks not just as mere technological artefacts, but as a system that serves multiple uses with multiple water users at times contradictory in nature. The multiple uses of tanks arise not only from water, but also from the land space the tank and its network occupies. Both the uses and users themselves could be in a conflicting relationship. Therefore, this research considers all uses and users together in understanding the conflicts.

From the survey of literature reviewed in chapter 3 and my professional understanding of working with tank programmes for over fifteen years, typical conflicts *about water* are: between irrigators and village members for the use of water during times of scarcity; between irrigators and dry landers[6] for the use of water during scarce times by irrigators with a right and without right; between irrigators and foreshore farmers / foreshore encroachers to avoid submergence of foreshore fields during floods and at full reservoir levels; among irrigators for the use of water during scarce periods; between irrigators and other users (fish contractors, cattle owners during water scarce times; conflict between tanks within a tank cascade[7] to receive and dispose floods; conflicts across tank cascades to access or dispose water from an unregulated ephemeral river or stream. Typically conflicts pertaining to tank space are between legitimate users (rights holders) and encroachers. The land space forming part of tank bed and channels are often encroached for housing, agriculture, mining, dumping pollutants and multi-various unauthorized uses by individuals and corporate entities, usually ignored by government bodies. Such encroachments ultimately lead to direct water conflicts and court actions.

While the tanks are ancient, the laws that govern them are of more recent origin and so based on a mix of differing traditional and modern legal principles, developed under the colonial rule. A range of laws deal with tanks that include a series of administrative orders, statutes on easements, environment, water and irrigation taxation etc., Of all, the series of administrative instructions called the Board Standing Orders (BSO) are the most important and widely used law in dealing with tank conflicts.

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[6] Dryland cultivators adjoining the designated command areas of tanks do use some amount of tank water for their crops. This is normally objected to by the authorised users of tank water.

[7] In this research Tank Cascade, Chain of tanks, and Tank Chains are used interchangeably.

Place

The area for the study is Tamil Nadu. The state is chosen based on my personal understanding of tanks and familiarity of language. The study sites are chosen based on the criteria discussed in section 3.4.

1.3 THE RESEARCH QUESTION

The central research question for the study is to evaluate the effects of casting traditional technologies such as tank systems into modern legal frameworks; and to find out whether traditional technologies operating within modern constitutional contexts provide answers to conflict between water users.

Therefore, this research looks at the role of traditional, national and local laws that define and deal with tanks. Since, it views tanks as technology systems it examines the relationship between law and technology, namely how much the law empathises with this technology. This is because the law is new and the technology is old and thriving. In order to develop such a holistic understanding, understanding the linkages between law and technology becomes important. The study thus involves enquiries into relationship between law and technology. The main research question is divided into the following:

- What defines the tank technology – modern or traditional in the context of time and space?; What are the consequences of modern technology interventions such as dam building, altering river hydraulics, establishing river control mechanisms etc.
- What are the water conflicts in tankfed areas; why do they arise? And, how do they get expressed?
- What are the laws that govern these systems and deal with conflicts; how and why such laws came into place; are they coherent as planned instruments or derived from many sources - as the situation warrants; what rights do the various actors (state, its institutions and agents, community, individuals and others) have with respect to tank systems?

Answers to these research questions are provided by taking a historical and empirical approach by selecting and investigating known disputes since modern law arrived in the State of Tamil Nadu. The approach, methods, analytical framework and study sites are elaborated in chapter 2.

1.4 TANKS AND THE RESEARCH

All tanks are manmade and they vary a great deal in its form, engineering and use[8]. Unless otherwise stated, tanks in this research only refer to tanks in Madras Presidency areas that comprise the present day Tamil Nadu and used for irrigation and other uses[9]. A discussion regarding the tanks, its components and tank cascades or chain of tanks follow in 1.8.

Tamil Nadu presently has 41,262 tanks and irrigates an area of 0.5 million ha[10]. Beyond irrigation, tanks do serve other numerous uses of tanks for its water and its space, and details of them are not reliably known[11]. The multiple uses of water

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[8]A manual of the former Community Development Department of the Government of India lists out different types of tanks. Variants of them include tanks meant for sub-surface water storages, flood moderators, river and canal linked tanks and many other combinations (Sinha 1957).

[9]Small ponds meant for drinking and domestic water use are often connected with tanks and draw water from them. There are percolation ponds created in order to store water for recharging ground water in some parts of India. These two varieties of water bodies are also called tanks in some literature. This research qualifies such tanks whenever used in the discussion.

[10] Department of Economics and Statistics, 2011. Season and Crop Report Tamil Nadu 2009-10 (Fasli 1419). Chennai. Available at www.agritech.tnau.ac.in/ pdf/2012/Season & Crop Report 2012.pdf [Accessed 6 January 2013].

[11]The multiple uses of tanks include- Fishery from water; forestry o the tank beds; horticulture on the beds and foreshores; clay, silt, sand and other minerals excavated from tank bed and channels. There is no summarised data available as like the irrigation details published annually in the Season and Crop Reports (SCR) of the Government of Tamil Nadu.

also include recharging[12] millions of ground water wells for irrigation[13] and domestic[14] use. Though the benefits of having tanks are many, they are shown to be in decline causing concern for people and policy makers[15]. This decline is also reflected in the numerous conflicts witnessed in tankfed areas[16].

Coming from a tankfed area near Madurai in Tamil Nadu, I have witnessed countless quarrels and even life threatening fights between individuals and between villages. Studying tanks has been an area of academic and political interest for scholars and policy makers for a long time. A range of studies have been undertaken by a variety of sociologists, economists, anthropologists, policy

[12] Hard rock areas are known to have water only in cracks and crevices and hence need to be recharged from the surface. Tamil Nadu being an area underlain with hard rock formations, tanks are the main source of recharging the wells (PWD 1995; CGWB 2008). Though it is a common knowledge that tanks are instrumental in making most of these wells perform, it is not known reliably how many millions of wells are benefitted by tanks.

[13] There are 1.83 millions of Ground water wells of which 1.8 millions are private owned and used for irrigating an area of 15.93 million ha of area (constituting 55.7 % of the total irrigated area in the State. Source: Department of Economics and Statistics, 2011. Season and Crop Report Tamil Nadu 2009-10 (Fasli 1419). Chennai. Available at www.agritech.tnau.ac.in/pdf/2012/Season & Crop Report 2012.pdf [Accessed 5 January 2014].

[14] There are no reliable estimates of how much is the contribution of tanks to household water use in the entire state. Households in Madurai city with a population of around 1.2 millions draw 58.6 MCM (Million cubic meter) water annually. This amounts to two third of the total demand for water for the city (estimated as 91.27 MCM per year) (Dhan Foundation 2012).

[15] Refer to MIDS monograph analysing the status of tanks for the last six decades in Tamil Nadu (Sivasubramanian and Gandhiraj 2009) and related discussions in policy seminars held by Anna University (CWR 1993), DHAN Foundation (Shanmugham 1996).

[16]Known from local conflicts in the villages, and court actions sought by city dwellers to save the urban tanks in towns like Madurai, Chennai, Salem and many towns in the state. Chapter 6 discusses about this phenomena.

analysts, agronomists and engineers. However, they have only touched upon tank conflicts in a passing manner.

Although these studies recognise to a varying extent that tanks are complex technical, social, economic and agricultural systems, they are based on disciplinary standpoints and hence limited in their approaches. The analysis and understanding developed about water conflicts and their effects on the peoples and systems are mostly researched using stand-alone approaches in anthropology, economics, legal studies, technological studies or engineering. Interdisciplinary or multi-disciplinary studies on tanks are limited. As a consequence, inter-linkages between all the connected issues may not be adequately understood.

1.5 POINT OF DEPARTURES

This study departs from the many studies cited above in the following ways: (i) it analyses how tanks should be viewed; (ii) decentralisation, the solution for tank development? (iii) the nature of law that deals with the technology; and (iii) the role of colonialism and the water law.

How tanks should be viewed?

Often it is repeated uncritically that the tank systems are small, simple, and local rain water harvesting systems[17]. Such narrow views of tanks arise purely from a minimalistic way of looking at these systems. The larger hydrological context in which tank networks are placed is often forgotten. I have taken an opposing approach and considered tanks as not necessarily small but complex and based on the understanding of a larger geography, namely a river basin and beyond.

[17] According to Centre for Science and Environment (CSE) a proponent of traditional ways of managing water, Rainwater harvesting "simply means catching and holding rain where it falls and using it. You can store it in tanks or you can use it to recharge groundwater". Source: Centre for Science and Environment. Frequently Asked Questions. Available at http://www.rainwaterharvesting.org/index_files/FAQ.htm [Accessed 12 November 2013].

This is because tanks do get inter-basin transfers of waters. This study therefore starts with the river[18] that gives life to many tanks inside the basin. In making this departure the study contradicts both the exponents as well as critics of tanks. The exponents of tanks who consider them as local/simple are yet to recognize the umbilical linkages between tanks and the rivers (or streams) that go beyond a tank or even a chain of tanks (or meso-catchments). Similarly those critics who propose larger reservoirs or centralized storages in rivers such as the CWC ignore the impact of such technological projects on existing tanks elsewhere in the basin(Central Water Commission 1986).

There is thinking that gigantic sizes, mechanical operations, complex administrative and management arrangements define ‘modernity’ in irrigation and technological systems[19]. Certain sections among the nineteenth century engineers[20] have also had such beliefs but they were well countered by those engineers[21] and administrators[22], who worked in tankfed areas in the then

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[18] Though it might sound a hyperbole to relate a river (covering a larger river basin spanning hundreds of square kilometers in area) with tanks located in any parts of the basin, it is actually the case. All rivers in the state – big and small have tanks in them. The biggest of all tanks – Veeranam is the main source for the biggest of the river Cauvery. Similarly all important rivers like Palar, Pennar, Tambraparani, and Vaigai have hundreds of tank networks fed from them.

[19] Refer to (Gilmartin 1994) for discussions ‘imperial irrigation science’ and ‘modernity’ in machines in (Adas 1989).

[20] Refer to a discussion between J.T.Fanning, a noted water hydraulics engineer emphasizing on mathematical theory and systematic designs required for a successful engineer. W.L.Strange prepared a complete manual to construct new tanks and still used by engineering departments in India (Strange 1904, iv).

[21] W.L.Strange in his preface to his tank manual said: “Mr.Fanning observes “An earthwork embankment appears to the uninitiated the most simple of all engineering constructions, the one feature that demands least of educated judgement and experience." I hope that the following pages will show that this opinion of the uninitiated is entirely erroneous, and that for the proper design and construction of such a work a very considerable amount of skill and attention is absolutely necessary if success is to be attained (Strange 1904, iv)”.

Madras and Bombay presidencies. They realized tanks are complex and dynamic systems requiring a deep understanding which is time consuming to learn about. This study considers their findings as valid and appropriate; and found them to have been true from more than eighty court cases (lower and upper courts) referred to in this research. Legal scholars who synthesized the doctrinal principles do not cover the ground why the many technical aspects raised in them are neither understood nor answered by the law and the courts. Therefore, this study goes beyond interpreting the legal principles used in these cases *but* discusses the technological issues it throws up that are not resolved.

Decentralization and tank systems

Scholars and activists (Vani 1992; 2009; Agarwal and Narain 1990; 1997) and policy makers (Aiyar 2002; Sivaramakrishnan 2000) continue to believe 'decentralisation' of administration and governance has a major role in conserving and developing water systems like the tanks. Several reports, studies and laws since 1866 addressed the subject in the former Madras presidency areas without making much change in decentralisation with respect to tanks. The process of decentralisation promoted through different models (including the Partnership and Local government models) by the government and donors (like the World Bank and DFID) continue to ignore the administrative rules in place that create bureaucratic rule. This research views the decentralisation in India from an empirical view point of what has been wished, debated and not achieved in tank areas.

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[22] Munro observed just the opposite of what Fanning thought as simple and layman's work. About forming new tanks in Madras Presidency areas Munro observed, "The residence of a European is too short in any one place to enable him judge correctly respecting the situation best adopted for a new tank. If he sees what he supposes to be a very favorable spot, where no work of that kind has ever before been raised, he may be certain that there is some insurmountable objection which has escaped his observation (Munro 1881, 81)". It is appropriate to believe the 'insurmountable objection' was nothing to do with any administrative or political reasoning but it is about the technology.

Nature of law that deals with the technology

Almost all medium and major projects were met with resistance, and new irrigation projects by the government since the colonial times are continuously challenged in courts by existing tank users in the Madras presidency. Scholars agree that a vast body of Indian water law is made up of case laws (Singh 1992; Cullet 2010; Cullet and Koonan 2011). However, they are yet to recognize that much of this body of law came into existence through the tank related disputes. There are limited studies on the link between law and technology that deals with the appropriation of water by larger systems (such as dams across rivers) and its impacts on comparatively small sized pre-existing tanks inside the basin[23]. There is a disconnect in academic studies in assessing the challenges made by tank users against the introduction of modern technology projects (such as building major reservoirs, changing river hydraulics, introducing river control mechanisms and head-works etc.) during colonial and postcolonial times.

Colonialism and the water law

Academic studies on Indian water law mostly focused on studying the statutes made by the legislature and the Parliament. However, tanks are mostly governed by administrative rules that were made by the colonial bureaucracy and most of it came as part of land settlements and land administration in Madras Presidency. This list of orders, which were issued by the Board of Revenue over two centuries in the colonial Madras Presidency and in the later post-colonial period, constitute this important body of water law. This research looks at the origin, assumptions and rationale behind the Board Standing Orders (BSO) with special reference to water.

[23]Exceptions to this include discussions by D'souza on contextually interpreting the principles of prescription as understood in Common Law in Tungabhadra basin (2005, 328).

1.6 ARGUMENTS

This research makes the following arguments:

1. The traditional systems like tanks operating within the modern legal frameworks with a codified law to govern - have limited capacity to provide answers to the many conflicts in tankfed areas and their eventual decline. As many scholars argued most of Indian law including water law as it exists is a legacy of colonial rule. However, I would add to their views that the main body of law that governs tanks is not even in statute form but that they exist as series of executive orders made by the bureaucracy. The bureaucracy in this case is the Board of Revenue. In the case of Tamil Nadu the Board of Revenue has functioned from 1786 to 1980 (when it was formally wound up) developing this body of law. The set of reasons for which these orders came into existence were different, varying over time, and most of it came to maximize the revenue collections for the government. Though the same reasons (for which these laws came into existence) might not exist today, the law and the system of administering them exists to date without any major changes.

2. The law that governs tanks and its many uses does not recognize that they are dynamic and changing systems requiring many local adaptations. In its hurry to maximize government revenue many technological issues behind the pre-existing arrangements in many rivers that fed tanks are ignored and continuously challenged. These traditional technological arrangements go beyond the land ownership and property claims established under the laws. The conception of property in law remains static and chattels oriented derived from conceptions of ownership. Government is the owner of all tanks and surface water flowing in any stream and river. The position remains unchanged in law as far as agricultural use is concerned.

3. The scientific rationale and any concern for keeping tank's technological integrity is little understood and rarely acted upon by the law and the courts. In the positivist legal systems that govern tanks texts are pivotal, the lack of positive evidence (in the form of documents) plays havoc with the technological integrity of the tank systems. Positive law with its textual emphasis and universal categories without substance is fundamentally incompatible with systems like tanks which are dynamic and that thrive on ecological well-being.

4. The modern technologies introduced in rivers and streams feeding traditional networks[24]of tanks have played a definite and detrimental role in destabilizing tanks. These technologies include reservoir building across the rivers, river control by head-works, altering the hydraulics of rivers and channels, establishing bureaucratic management in rivers and *anicut* systems, and establishing complex river water accounting measures. Also, I argue that these technological arrangements ended up favouring only those areas under government control for revenue collection (*ryotwari*) and played havoc with tanks in the *zamindaris*. No concerted attempt has been made to incorporate tank systems into modernization programmes at a level it deserves.

[24]In the Madras presidency, three major categories of land tenures existed until the transfer of Power from the British. Under the *ryotwari* system the land holder paid tax or revenue direct to the government and these villages were called government villages. Under the *zamindari* system, an intermediary class was introduced to help the government in collecting the land revenue. These villages were called *zamindari* estates. Under the *Inamdari* system, lands in a village (in part or full) were settled as gifts for specified purposes either to groups or individuals with a full or part remission of tax. *Zamindari* system was abolished in 1948 and *Inamdari* system was abolished in 1963. Presently, all lands in the State is settled as *ryotwari* (Chandrasekaran 2002).

5. The integrity of tank systems is lost because of many laws and policy interventions – such as disposing tanks for building bus stands, public amenities etc., Many such interventions did not recognise tanks as sophisticated systems sustained for centuries rather they simply treated tank as land property owned by government put into different use. Conversion of tanks in many urban and sub-urban in Tamil Nadu is a phenomenon that arises out of such a policy and interpretation of government ownership.

6. The so called river modernization programmes in tankfed areas lead to environmental disasters destroying historic channels and tanks. This issue is examined by using Vaigai river modernization programme and a few court cases as evidence. These technology programmes claimed to develop tanks but did not understand the consequences of changing river hydraulics and control methods. The planners including the engineers and administrators do not recognize that there is logic to why they are constructed the way they are. Case studies of Vaigai and Kothai *Anicut* system substantiate these arguments.

7. The administration, the state, separation of powers and delegation of power are problematic. Poor documentation of revenue and engineering records remain a concern for the future of tanks on the whole. Case studies of Vaigai and Kothai demonstrate many technical or technological arguments advanced by the traditional and rightful users of these tanks were never given a good hearing by the executives, legislature and the courts during their long struggle to save their systems. Based on these, I also argue there is an inherent bias against agriculture, farmers, and traditional systems in all the three limbs of the state i-e) Legislature, Executive, and Judiciary.

1.7 STRUCTURE OF THESIS

There are ten chapters in the thesis. Chapter 1 introduces the research and provides some technical details on tanks and tank cascades. Chapter 2 details the approach, methodology and the analytical framework chosen for the study. The study preferred an interdisciplinary dispute focused approach in undertaking a socio-legal case study of tank conflicts done at three different levels. These levels include Micro, Meso and Macro levels covering individual tanks, chain of tanks and a major river basin in Tamil Nadu.

Chapter 3 provides a literature review, the past and present debates surrounding irrigation in general, and tank systems in particular with references to tank conflicts. It highlights the gaps in knowledge related to understanding different types of conflicts in tanks and understanding the role of law in dealing with them. Irrigation is the major use of tank water that generates numerous conflicts and hence a brief background of tank irrigation in the study state is provided. The chapter further goes on to elaborate the many ways of viewing the tank systems. The differences in viewing them as a mere source of irrigation as against a multiple use/ecosystem are highlighted to understand the conflicts such a complex system would generate. Several dichotomies plaguing academic and policy debates related to traditional technologies are highlighted. This is done to show that the tanks are dynamic systems survived a long period in history and cannot be put into any binaries. Since the tank systems have witnessed different types of conflicts of which we have some records from the historic past and they too are reviewed. This is done to see the differences in resolving such conflicts between the modern era and in the distant past. A review of various theories related to Water and State, Water and Institutions, and Water and Common Property Resource (CPR), Role of the State in water development, and Community management of the past and present are reviewed to give a background for the ensuing discussions in the following chapters. The present legal environment in which these systems operate is described in order to provide a background for the extended discussions in the next chapters and case studies.

Chapter 4 describes the simplistic understanding held by policy makers since the colonial times about the tanks and reflected in law and policy. The policies related to water in general, and tanks in particular originated mainly from the land revenue policies of the East India Company (EIC) which intended to maximize revenue generation in the short run. The discussion also shows such a visualization in law and policy led to a differential treatment between large and small tanks based on size; differentiating government and private tanks based on private property; differentiating *zamindari* and *ryotwari* tanks based on different settlement policies etc., It is argued in this chapter that firstly that the land settlement policies did not take into account of the tanks as a technology but rather considered them as a landed property. Secondly these policies created the property regime solely aimed at maximizing the government's land revenue with a short term focus on financial performance. Thirdly the policies did not envisage an adequate technical documentation of all tanks making inadequate and incomplete data about them. Fourthly the tank development policies after the transfer of power in 1947 remained the same as it was during the colonial rule which again adversely affected smaller tanks.

Chapter 5 traces the water law from the early nineteenth century to date to show that it is the bureaucratic reordering and governing of water rather than any coherent understanding of land, water and the communities. The discussions in this chapter highlight that most of the available academic discussions on Indian water law are limited to the study of statutes and case law thereby giving a false understanding that water law emanated from legislatures and the upper courts. Emphasis is laid on the Revenue Board standing Orders (BSO) that forms the core of the water law in the state of Tamil Nadu. A historic approach is followed here to show the rationale, motivations to evolve such a body of law. The source materials for this chapter are drawn from different BSOs issued since the beginning in the early nineteenth century to date. I argue in this chapter that the bureaucratic intentions and actions to realize increased revenues through these administrative orders resulted in total government control over tanks for its water and other uses. The key proposition here is that the colonial law is not simply a 'legacy' but a living law in the State, and that is one reason that the office of the District Collector meant for revenue collections as established by the East India Company (EIC) still holding crucial hold on administering the rivers, tanks, its water and usufructs. The chapter concludes the law governing tanks are an administrative creation, and in itself remains a source of conflict from the days of the British to the present. This discussion further provides sufficient background to understand the case studies discussed in chapters 7 to 9.

Moving on from the bureaucratic creations in law, chapter 6 discusses the role of case laws affecting the tanks. The judgements pronounced by the Privy Council, Indian Supreme Court, and various High Courts are the source material for this discussion. This chapter uses over 50 case laws specific to tanks that were results of tank conflicts occurred in different situations over a long period of 160 years. The aim of the discussion is to critique and show how these judge made laws also lead to government monopolizing the tanks, river and all surface waters. The courts at various times defined what rivers are?, and what tanks are?. The understanding derived from these definitions is very different from a technological standpoint, common wisdom and practice. The chapter also shows that legal understanding developed by the superior courts on occupancy rights have led to perpetuating conflicts between tank users and encroachers even today. Also the chapter highlights, the role of superior courts in curtailing the customary law related to tanks. The courts have little appreciation of the novel legal doctrines such as the 'sustainable development' and 'preservation of environment' applicable to tanks. The discussions complement the previous chapter and bring a complete understanding of the water laws affecting tanks in entirety.

Chapter 7 presents a macro-level case study of Vaigai basin that explores the role of law and technology in` making and resolving conflicts in a traditionally tank intensive area. Vaigai basin is known for its tanks for many centuries and the modern technological interventions introduced over the last 100 years affected the performance of traditional tanks in the basin. The evidence for constructing the arguments made in the chapter comes from related archival documents, government orders and correspondences, government reports, original project documents related to the major interventions, judgements related to major disputes, court petitions of the ongoing litigations, farmers' petitions to government, pamphlets and other literature generated by the agitating farmers, and technical and engineering reports made by government departments, consultants, and research institutions. These interventions include river control mechanisms, building major and medium reservoirs, establishing bureaucratic controls through rules of operations over river management and acquiring monopoly control over waters. The discussion shows the performance of the traditional tanks have come down and the dependability of tanks come down from 71.43 % in 1885 to 33.33 % in 2001 due to the technological introduction in the basin. During the same period, serious conflicts between the traditional users of the river and the government arose and reached courts for resolution. The case study considers tanks as interconnected systems in a larger geography at a basin level and beyond to show that they are complex and dynamic structures not understood fully whenever interventions are planned. When read in conjunction with the previous discussions of the development of water law, in chapter 5 and 6, this case study offers a holistic understanding of law, technology and water conflicts affecting tanks in a macro-level. The case study further shows that the traditional system of developing tanks are based on a detailed understanding of the basin that is yet to be understood technically. It is the modern interventions done in the last one century and the courts ignored the hydrological basics of their existence.

Chapter 8 is a case study of a meso-level system and conflicts faced in tanks within Kothai *Anicut* system (KAS) located in the ancient township of Palani in the Cauvery basin. This case study is constructed based on the field visits, discussions with farmers, using a range of documents including farmers' petitions, court judgements and petitions, maps prepared by Land Revenue Department, and records of the Public Works Department (PWD). KAS is an ancient network of seven tanks connected to Varadhamanathi stream. This case study shows the sub-basin has undergone technological interventions in the form of building a reservoir, controlling storage, and altering the size and shapes of tanks within the sub-basin. Many of the changes made to tanks are for extraneous reasons that are unconnected with water development. This again has led to a range of conflicts and expressed in agitation and court cases for over three decades. Further, the chapter highlights the conflict between the tank users and the encroachers where the government as a protector of tanks did nothing but join the encroachers to destabilize the entire system. The case study also complements the understanding developed in chapter 5 and 6 by the following arguments: Firstly, the law regarding the tanks do not treat them as a technology system and uphold their technological integrity when any change is introduced; secondly the government treats the tanks and dependent farming communities as less important and clearly biased against agriculture; thirdly the existing laws that were meant to protect tanks are seldom implemented when the government and the bureaucracy desire not to.

Chapter 9 analyzes the local or micro level tank conflicts using 9 lower court cases of which some are ongoing and others resolved. In many ways, this chapter is about the 'most local of local details' related to tank conflicts at the micro level. This would help us to understand the nature of law that is practiced in the state. By taking up, these cases as evidence the chapter finds out whether tank is considered simply as a land property or as a technology system by the courts. Based on the discussions of these micro level case studies the following arguments are made. Firstly, the law takes a simplistic view that tanks (including sluices, weirs and channels; trees, fish, silt, sand and other benefits obtained from tanks) as appurtenances of landed properties defined and held through property rights. Secondly the technological integrity of tanks are least considered when conflicts come for resolutions before the courts. Thirdly, the documents (and the documentations) issued for tanks under the land revenue laws continue to be problematic. Fourthly the government role in resolving the conflicts are limited to solve immediate issues rather than attending to the systemic issues. This chapter builds on the macro level and meso-level conflicts discussed in chapter 7 and 8 by offering mostly an *intra* tank and inter tank view of them.

Chapter 10, the final chapter returns to the research questions and concludes the implications of the law and technology interventions in the tanks.

1.8 BRIEF TECHNICAL BACKGROUND ABOUT TANKS

Tank memoirs

The technical specifications about tanks began to be recorded by engineers trained in modern engineering in the later part of nineteenth century. The teams of engineers would visit every tank and record what they have noticed. This included the technical features of the catchment, tank bund, waterspread areas, tank sluices, weirs, *ayacuts,* levels of bunds, sluices, weirs and any other special features found in tanks. Tanks used for surface irrigation alone were recorded in the memoirs. It did not codify or document the thousands of ponds and temple tanks. Tanks meant for other uses such as domestic, drinking and cultural uses vary in designs and engineering. Annexure 1 is an example of a Tank memoir shows more than eighty technical features described for *Mela kuil kudi tank* that has an *ayacut* of 110 ha located near Madurai. Figure 1.11 and Figure 1.12 show different views of tanks, command areas and sluices.

Site selection for tanks

Like any reservoir building, the construction of tanks depend upon many technical parameters that include total and seasonal rainfall; supplies from rivers or streams; knowledge about rainfall intensity and pattern; topography of the place; soil types; geological formations; and the availability of land for tank construction and agriculture. Above all, the availability of people to live and practice agriculture. All tanks are closer to habitations and it is rare to see any tank that is far away from any human inhabitation.

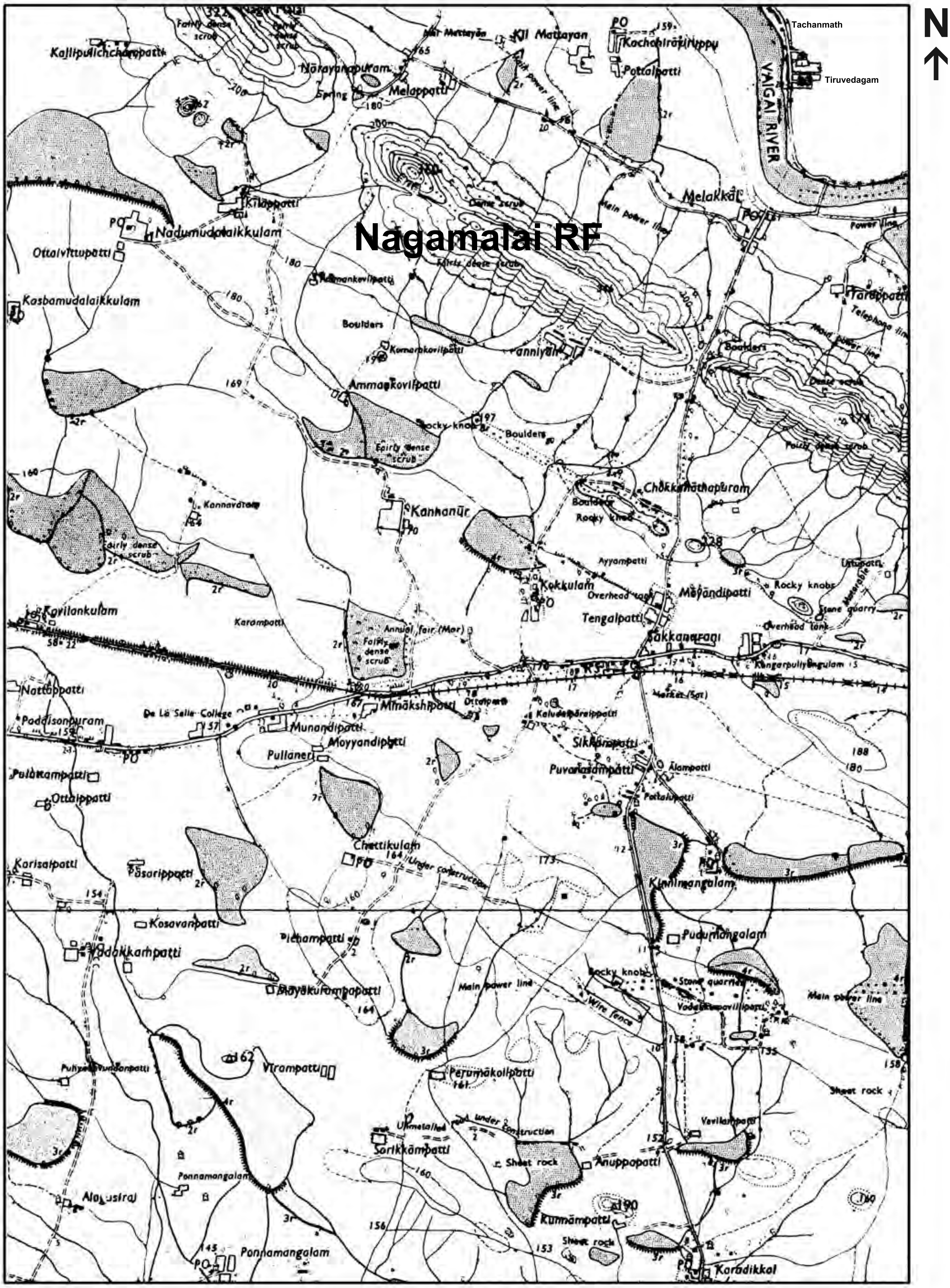
Figure 1.1 illustrates a typical tank intensive area in Madurai district in Vaigai and Gundar river basin. Within a 110 sq.km area there are 58 tanks and 60 habitations next to them and most of the tanks are fed from streams taking off from nearby Nagamalai hills and uplands. All tanks are found within a radius of 1 km from the habitations.

Tank components

The components of tanks include the (i) tank proper (i-e) tank bunds, sluices and weirs; (ii) *ayacut* (with channels), (iii) catchment (immediate and distant). Figure 1.2 shows a schematic diagram of a tank system with its catchment above and the command area below to it. Figure 1.3 illustrates the parts of a tank proper and the command area.

Size of tanks

The tanks could be small or big or of any size. Many tanks are semi circular in shape and others are in all kinds of shapes. The shape is determined by the topography of the place where the tank is located. Figure 1.4 shows a small geography of around 100 sq.km having 388 tanks.



Not to scale. Approximate area 300 sq.km

Fig 1.1 A section of topographic sheet showing tanks, channels and villages in Madurai district

Source: Survey of India Toposheets

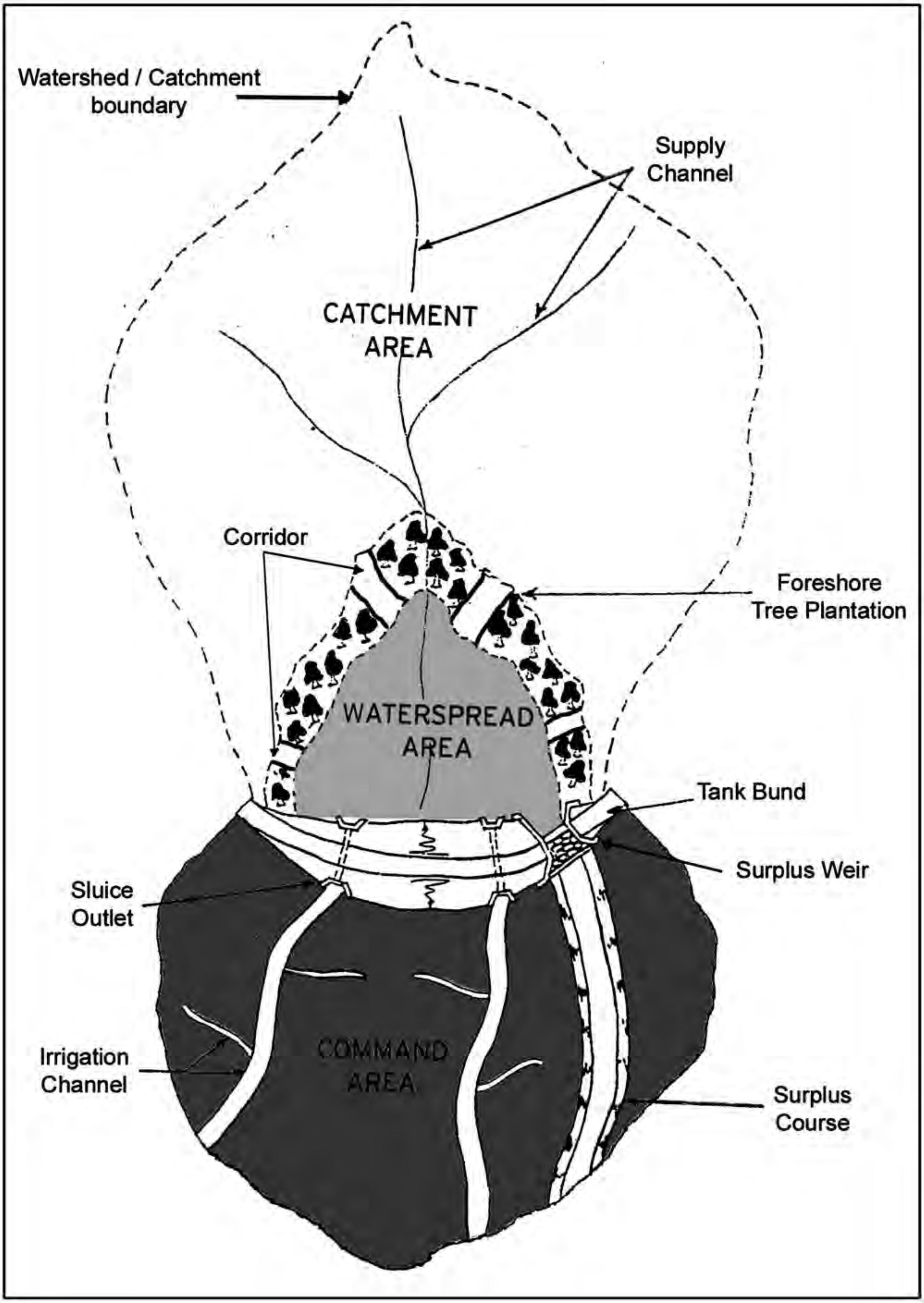


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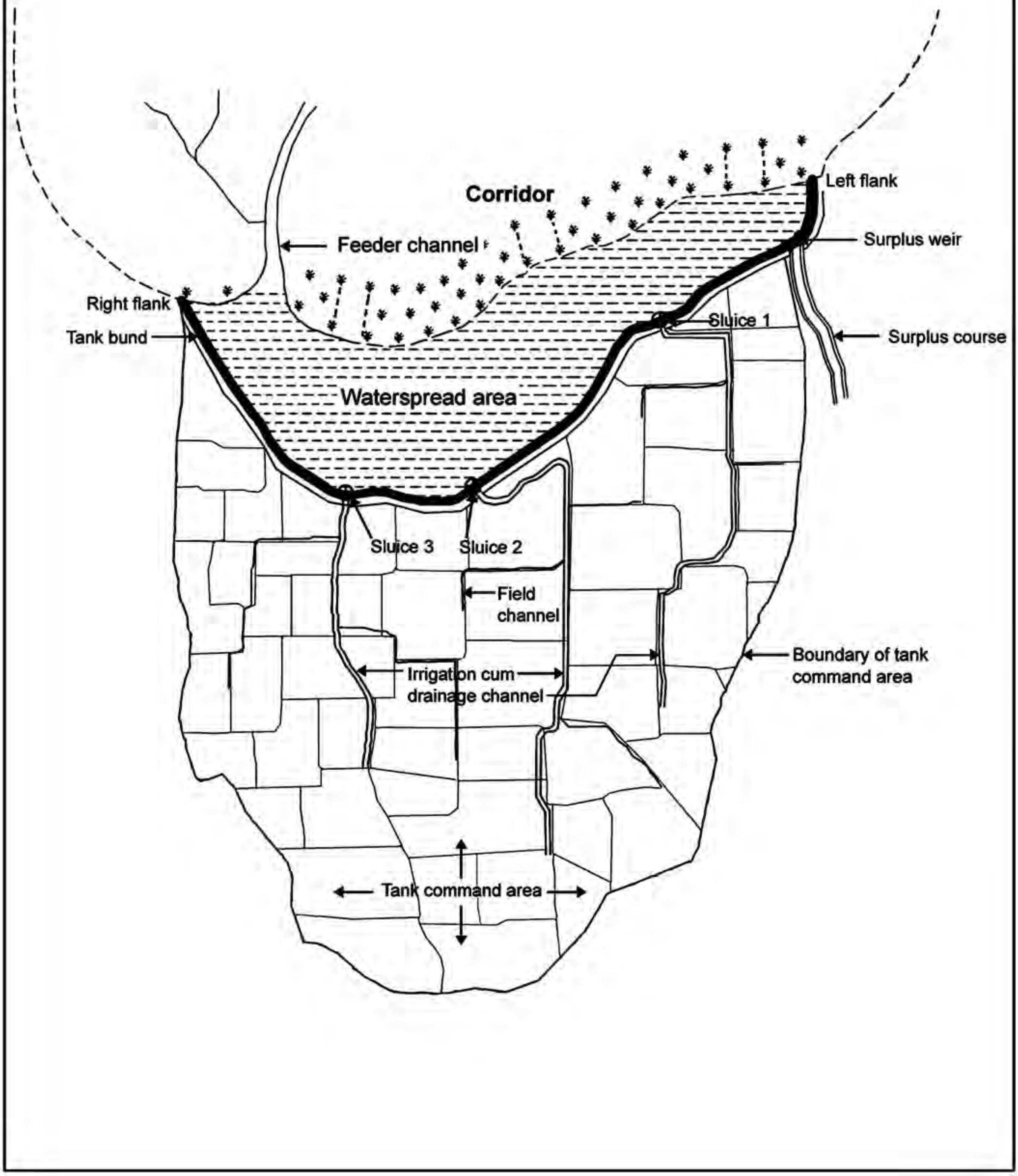
Fig 1.2 Schematic diagram of a Tank with Catchment and Command Area

Source: Shanmugham (1996)



Not to scale

Fig 1.3 Schematic representation of Tank and Field Channels in Command area

Scale 1:50,000 388 Tanks in an area of 104.66 sq.km.

Fig 1.4 Small tanks found in a 100 sq.km area in Madurai district

Source: Survey of India Toposheets

About the varied sizes of tanks in Madras Presidency, an expert engineer summarized as follows:

> These tanks vary in size from a few acres to nine or ten square miles of water surface. They are usually formed by throwing earthen embankments across small local drainages, often with a catchment area of only two or three square miles, or by a series of such embankments thrown across the valleys leading from larger catchments. The floods are impounded in this series of tanks and utilized subsequently for irrigation; the surplus from one tank flowing by escapes channels to that below (Reynolds 1906, 4).

Isolated and Chain of tanks

If any tanks receives water only from its immediate catchment alone it is called an isolated tank. But isolated tanks are not many. Most tanks are interconnected either to draw water or to pass on the surplus water and are variously called chain of tanks, tank cascade or group of tanks.

Tank Cascades

According to Ellis, the series of tanks located one below the other are called chain of tanks, or groups of tanks (1963, 257). Mosse has found in Sarugani basin out of the total 2,041 tanks only 55 are isolated tanks and the rest 1986 as interconnected chains (Mosse 2003, 43). According to Madduma Bandara, these chains of tanks can also be called as tank cascades when, "connected series of tanks organized within the meso-catchments of the dry zone landscape, storing, conveying, and utilizing water from an ephemeral rivulet. (Cited by Panabokke et.al (2002, 28))". Figure 1.5 shows a schematic diagram of Bandara's definition and demarcation of meso and macro basins. However, in Tamil Nadu many ephemeral streams and other naturally occurring river channels are trained beyond recognition, and extended & elongated to newer areas that are far away and add to the above definition. Hence, a cascade may also be defined to include not only the ephemeral river but also a manmade channel.

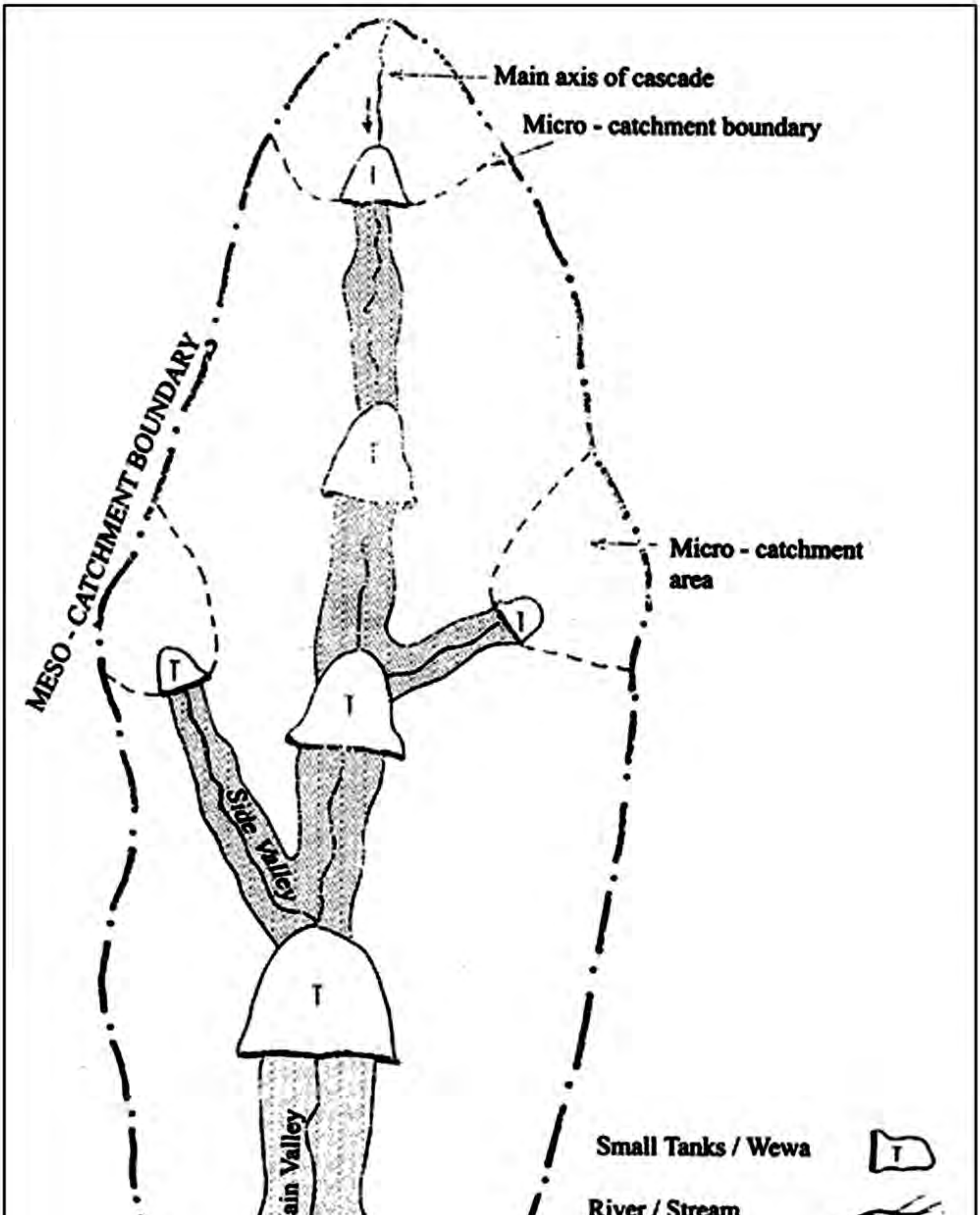


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Fig 1.5 Schematic representation of a small tank cascade

Source: Panabokke *et al* (2002,73)

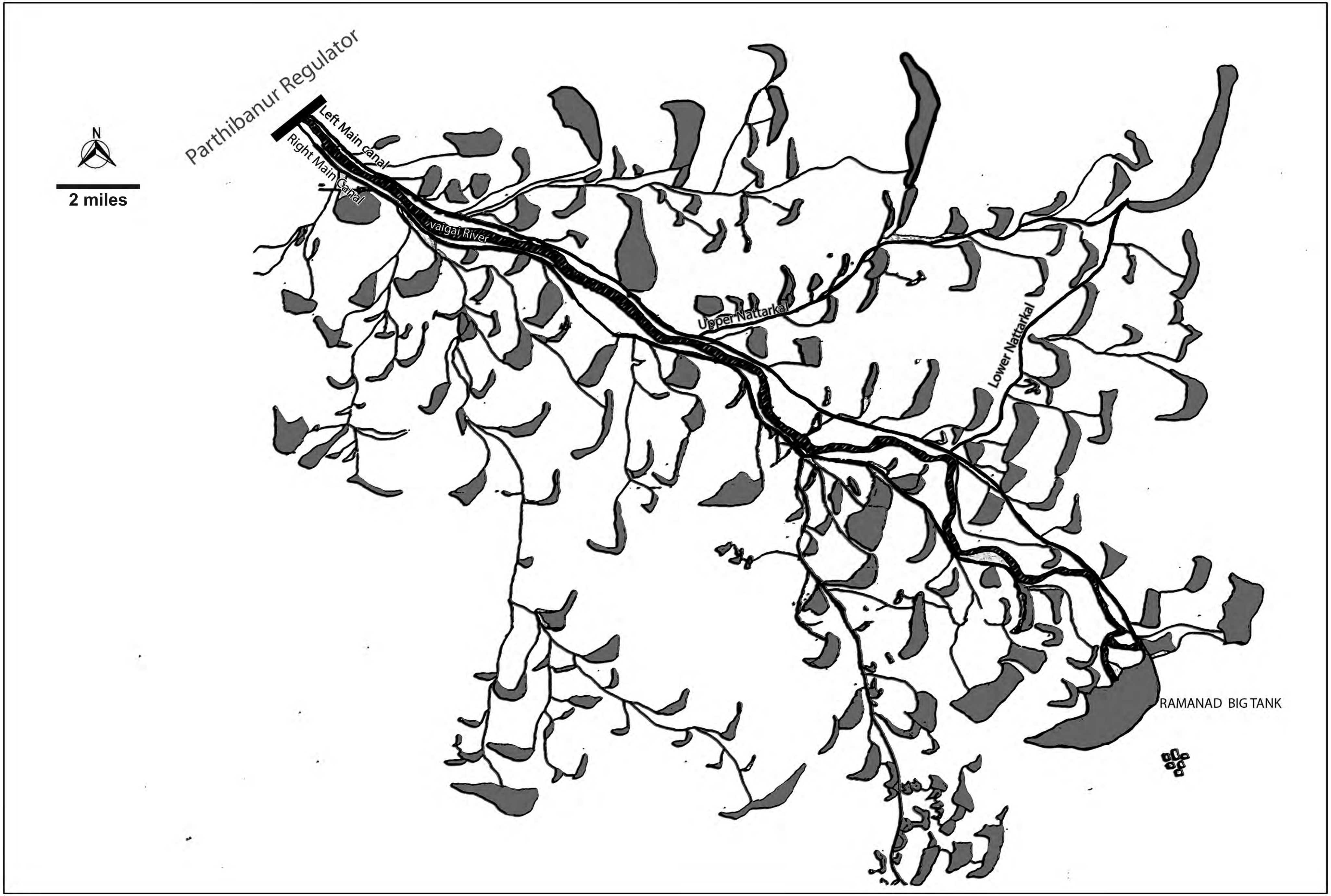


Fig 1.6 Index map of Lower Vaigai basin-Parthibanur to Ramanathapuram Big Tank

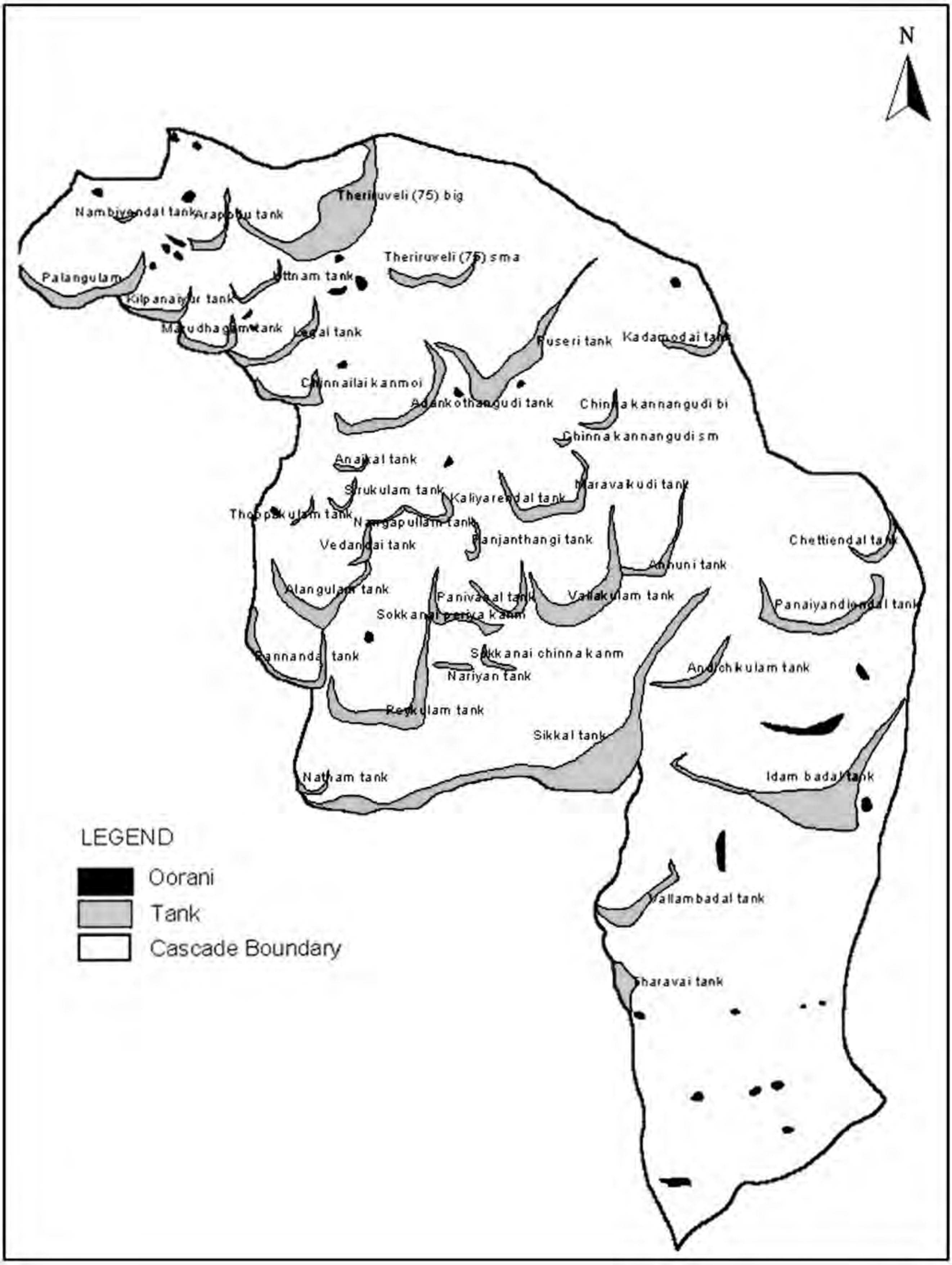
Source: Executive Engineer, Lower Vaigai Basin WRO-PWD, Tamil Nadu

Therefore, a tank cascade in common parlance represents a meso-catchment and it is again connected to a river or a major stream and hence with the macro catchment. Figure 1.6 on Vaigai shows many tanks in the entire Lower Vaigai Region (LVR) are linked to the river and hence the macro catchment to receive, store, distribute and dispose water. The river ends up in a tank named Ramanathapuram big tank.

Channel arrangements within tank cascades

Tanks in a chain are normally fed by a single supply channel however there are numerous exceptions. A single tank may receive water from more than one supply channel taking off water from different meso-catchments and hence benefit from many cascades above it. There are a number of examples including Tharavai tank cascade with Sikkal tank receiving supplies from four different chains and also from field drainages (Figure 1.7). Also, Villur chain of tanks in Madurai district spread in six revenue villages with many complex network of supply channels and interconnections (Figure 1.8). The arrangements of linking tanks are complex in topographies that are plains. In the plains, artificial channels can be taken from anywhere even bypassing some tanks found in the middle. Ilanthaikulam tank cascade in Ramanathapuram district wherein the tank in the middle receives after the tail end is filled up[25] (Figure 1.9). A dispute in this chain of tank is currently heard in District Court regarding a new channel proposed by this tank.

[25] A case is in the District Court about this issue. Contrary to common beliefs that upper caste villages are mighty and powerful in enforcing their might over getting water even by aggression is defied in this dispute. Vagaikulam, a lower caste village located in the end of the chain has the privilege before the upper caste village of Ilanthaikulam in receiving water.



Scale 1:50,000

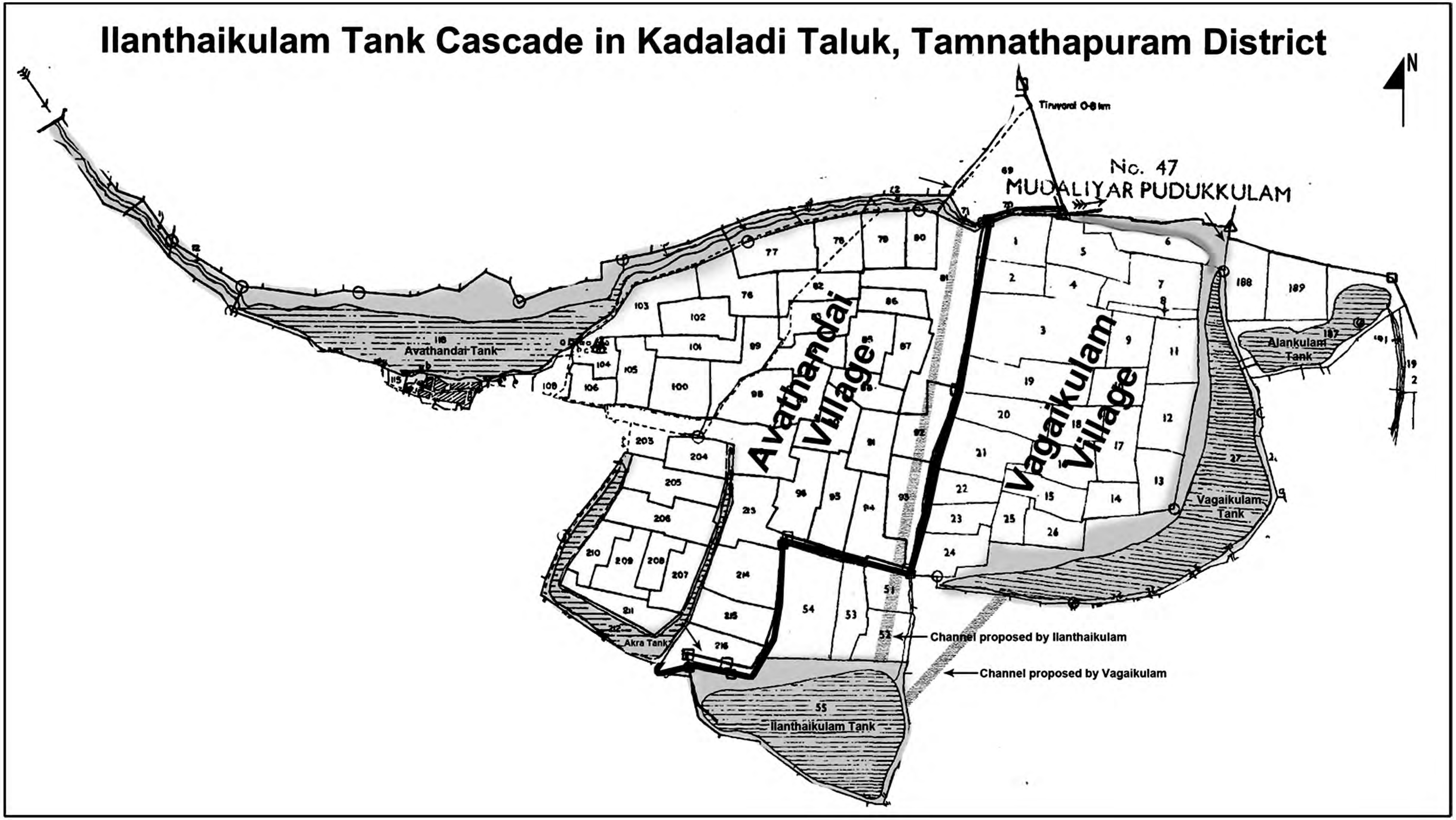
Fig 1.7 Tharavai Tank Cascade in Ramanathapuram district

Source: DHAN Foundation (2003). Tank Cascade Atlas - Gulf of Mannar Bio Reserve Bufffer Zone Area

Not to scale.

Fig 1.8 Villur Tank Cascade, Madurai district with Tanks and Channels

Source: Combined from the respective village maps of nine villages published by Directorate of Land Survey and Records, Government of Tamil Nadu



Not to scale. Approximate area of watershed 9 sq.km

Fig 1.9 Ilanthaikulam Tank Cascade, Ramanathapuram district

Source: Combined from the respective village maps of two villages published by Directorate of Land Survey and Records, Government of Tamil Nadu

Ilanthaikulam tank lies at the end of the watershed is in conflict with Vagaikulam regarding a supply channel proposed by it. The proposed channel aims to draw water from Avathandai tank that also supplies to Vagaikulam. Court cases are fought by these two tanks for the last two decades without any resolution in sight.

Tanks receiving supplies from sluices of upper tanks

Normally tank sluices are meant for supplying water to an *ayacut*. However, at times it may be used to supply water to a lower tank. Refer to the case study of Kothai *Anicut* system in chapter 8 to understand this phenomenon. Vaiyapurikulam tank, with a command area *(ayacut)* of 312 ha receives water from Idumbankulam that has an *ayacut* of 35 ha. The technical rationale to have such a facility is due to the location of the respective tanks. The space for *ayacut* in the Idumbankulam is smaller, constrained by high grounds, and it is not possible to use all the water within its own *ayacut*. However, the tank is formed by closing a deeper valley and could store more water than it can use. Hence, a small tank with very high storage provides water to a big tank with lower than the required water availability[26]. Sometimes big sized tanks do supply water to smaller tanks below them.

Also refer to chapter 9 for the legal case *K.A.Karuppiah Thevar v Raju Thevar* wherein Nelmudikkarai tank with an *ayacut* of over 800 ha supplies water to the smaller Irukkumadi tank with an *ayacut* of 48 ha from its fourth sluice. All these technical arrangements do have legal arrangements in the form of codification or customary practice by villagers. Chapter 9 discusses about water conflicts that arise when these arrangements are put under pressure due to changes introduced in the macro–level.

<u>*Sluices*</u>

Sluices may be pipes buried under the bund or well built tunnels to deliver water to the command areas or the *ayacut* areas. Normally channels taking off from a sluice may or may not branch on its way and feed the designated *ayacut*.

[26] Water stored in the tank per ha of *ayacut* for Idumbankulam is 0.032 Million cubic metre (MCM) and for Vaiyapurikulam is 0.0117 MCM. Both tanks are single cropping areas and no extra privilege for Idumbankulam farmers like additional cropping season etc., All tanks are treated equals.

However, there are arrangements in many tanks wherein a particular sluice with lower sill level may serve beyond its designated area whenever water is scarce. For example, the case study of KAS in chapter 8 shows a dispute *(Murugaiyah Thevar V The State of Tamil Nadu, Velu Pillai*) between farmers about such a practice.

Location of large tanks

Generally larger tanks are found in the end of chains to store flood waters. But, it is also noticed that many large tanks are found in the head of the watersheds as well. There have been no engineering or technology studies to find the rationale behind the sizes and designs of tanks[27]. At best some guesses are made by scholars who imply politics and social inequities in the pre-colonial societies behind the decisions related to designs[28].

Tank bunds

Tank bunds have standard dimensions with a trapezoidal cross section. Normally bunds are thrown across the slope to maximize the storage in a smaller area. In rolling topographies tanks are found closely following one another. However, in planes, tanks are formed in every directions and no uniformity exists. The supply channels that divert water from the catchment define the size and capacity of tanks in the plains. Some discussions related to this phenomenon can be found in chapter 7 on Vaigai.

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[27] Based on my own work experience with Tanks, discussions with experts and visits to Anna University's Centre for Water Resources (CWR) to look for recent theses on Tanks.

[28] Esha Sha writes, "in the pre-colonial historical context, the site selected for tank construction was primarily a function of political will to invest in that locality and the topographical features of the site played a secondary role (Shah 2003, 38)". Similar arguments are made by others including (Bijker 2007).

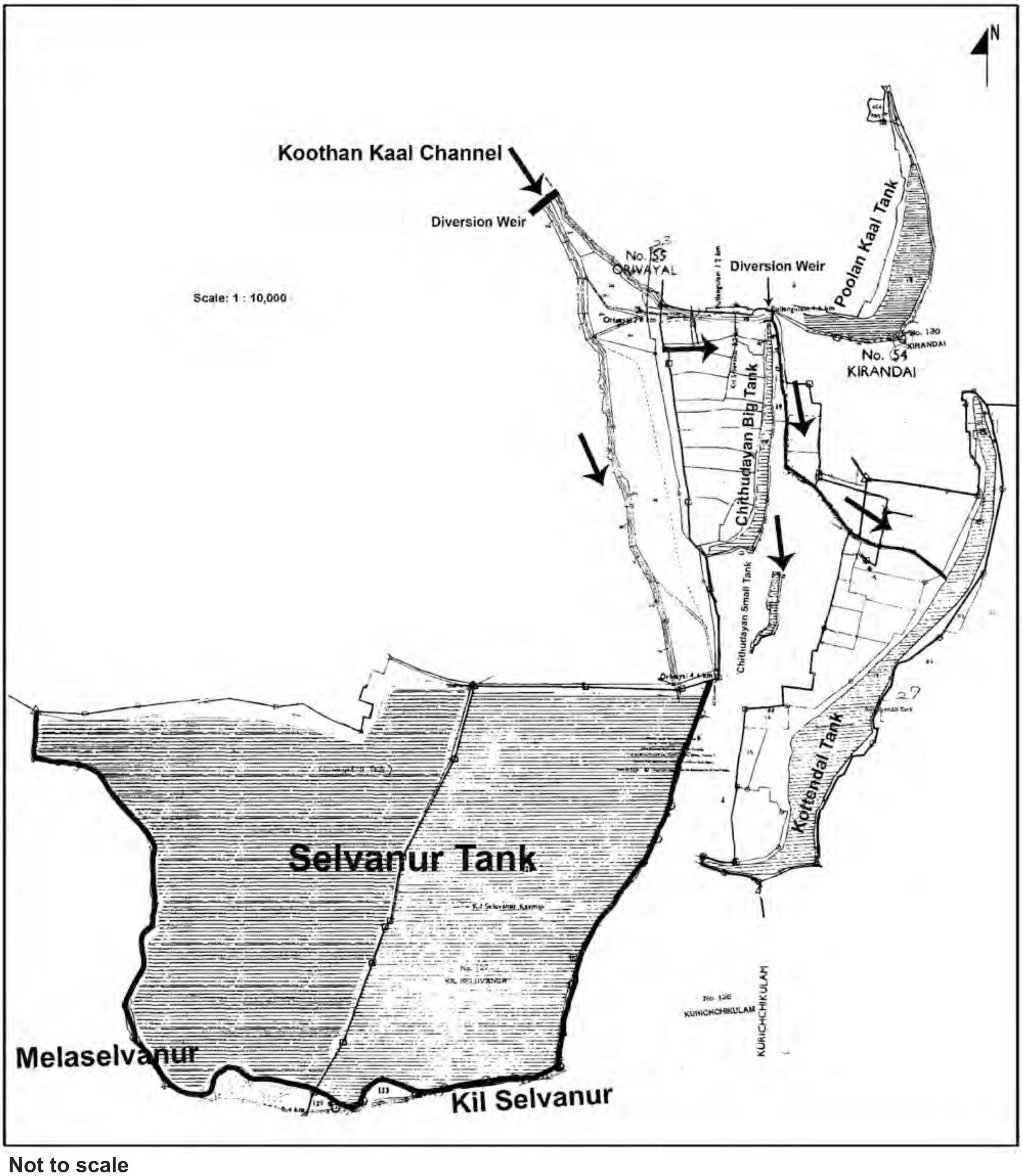
Tanks in rolling topographies are deeper and have less waterspread area per unit of irrigation. This reduces the tank bed area required for forming a tank.

Tanks may or may not have their entire *ayacut* in a single revenue village (unit of revenue administration). A single tank with its bed located more than one village may serve an *ayacut* located in a third village. Disputes in passing of excess water, using the tank bed for agriculture, fishery and enjoyment of nature might arise in such cases. Some references to disputes are made in this research. Refer to a Figure 1.10 showing Selvanur tank which has its tank bed alone spread in two revenue villages, and received water from a third village.

Weirs

Weirs in most tanks are masonry constructions similar to a wall with or without openings. Sometimes, weirs are provided with pillars to enable temporary heading up of water storages and called *Caligula*. Weirs are expected to pass down the surplus of a tank safely. Many tanks do not have the luxury of well built weirs and rather pass down water through open cuts or ground *escapes* at the end of the bunds.

Figures 1.11 and 1.12 provide various views of tanks with its components such as channels, sluices, weirs and bunds.



Not to scale

Fig 1.10 Selvanur Group of Tanks, Ramanathapuram district

Source: Combined from the respective village maps of three villages published by Directorate of Land Survey and Records, Government of Tamil Nadu

Selvanur tank lies in two different villages while its network of channels are spread in three revenue villages that are in conflict with each other in sharing the supplies from a common catchment area.

Photo 1 View of a Tank with water and Ayacut

Photo 2 View of a Tank with water

Fig 1.11 Photographs of Tanks

Photo 3 A view of a tank with paddy fields and water at the end of season

Photo 4 A view of a tank with foreshore encroachments

Figure 1.12 Photographs of Tanks

2. APPROACH, METHODOLOGY AND ANALYTICAL FRAMEWORK

As referred in the previous chapter, studies on irrigation and the tanks were made by different scholars from irrigation studies, sociology, history, economics and water management. The approaches to these studies vary widely. This chapter discusses the approach taken for this research.

2.1 INTRODUCTION

Different approaches are used in the literature to study irrigation systems including the tanks. Gilmartin suggested that the engineers of the British government while developing new irrigation projects adopted an ‘engineering approach’. For example, estimating water availability, quantum required, and fixing the ideal areas for irrigation were done using mathematical computations without any hearing from the locals. According to him, the importance to ‘local knowledge’ or ‘local views’ held by the natives or farmers were not considered in such an approach (Gilmartin 1994). There are others who studied irrigation management projects in Philippines and India and believed a ‘participatory approach’ wherein the users, and how they actually view and use the systems are considered important (Wade 1981; Chambers 1988). Differing from them, Uphoff considers irrigation as a socio-technical process wherein ‘human and physical aspects’ of the systems are involved. Thus, a socio-technical approach envisages ‘knowing’ as it is practiced by the local people with some amount of technical analysis along with social understanding of the systems (Uphoff 1986; 1991; 1992). There are others who study ‘irrigation institutions’ as it exists and functions with or without any formal authority. This is termed an Institutional Approach and studies on tanks were undertaken (Coward 1980; Janakarajan 1989).

Differing from all of the above, Mosse believes technology, participation and management need to be ’placed in the larger social and historical perspective’ (Mosse 2003, 21). According to this approach, the role of history and the social/political situation of the area also need to be investigated and understood. This approach resembles what Ostrom calls the socio-ecological approach (2007; 2009). Though the nomenclatures vary and appear to be distinct, in reality these approaches do overlap for the simple reason that irrigation (or water) by nature involves some amount of technical or technological aspects, institutions, participation, and management.

2.2 INTERDISCIPLINARY APPROACH

Most research is discipline oriented. However, “disciplinarity is about mono-discipline, which represents specialization in isolation (Manfred. 2005, 6)”. The research problem in this study covering law and technology cannot be put into any single discipline. In studying tanks and tank conflicts there are many more reasons to move beyond a disciplinary approach. There are several reasons for choosing an inter-disciplinary approach for this research. First and foremost, the tanks are not only technical systems but are multi-use ecosystems where different disciplines – engineering, water management, forestry, fishery and agriculture - converge. Second, the study is about conflicts in these tanks. Conflicts are sociological and socio-legal phenomena and they have to be studied in light of tanks as a socio-technological system. Therefore, an interdisciplinary approach is taken encompassing the three aspects of this research.

2.3 STUDYING TANKS AND TANK CONFLICTS

Irrigation technologies in general encompass not only artefacts but also have differing customs, methods and procedures of operations, varying technical designs, agricultural, and water management practices. Tanks are no exception to this. I prefer to adopt an inclusive definition of Technology which does not compartmentalize its components, operating procedures and practice. The ***integrity*** of each of them has to be maintained in order to make it function well. Therefore, I define the technological integrity of a tank as *completeness in all the needed technical parameters of a tank and its various components*.

For example, a supply channel of a tank even if it constitutes a fraction of its size will be crucial in making the tank live or dead. If a supply channel for a tank is closed or constricted it may not receive the necessary supplies even when it has a good catchment. If a water-spread area is converted to something else it would reduce its storage and hence the irrigation performance. Similarly, a reduction in the designed length of a tank weir may destroy a tank within minutes during peak floods. Hence, any consideration about the tank has to be thought *in full* in terms of preserving all its components.

Further, most tanks are interlinked water systems. They are hydrologically linked with the tanks above and below either for getting or for disposing water. This is done through the supply channels and rivers. Various technical studies made by technical Institutions such as the IWMI have established that the tanks are interlinked, and hence need to be considered as cascades for studying them. These studies even suggest such an approach would be helpful in re-developing or rehabilitating tanks. (See (IIMI Studies 1994; Sakthivadivel, *et. al*. 1996; Sakthivadivel, *et. al*. 1997)). Similarly, action research projects funded by the European Commission (EC) in the last 15 years, have treated and considered tanks as interconnected systems going beyond administrative boundaries. They too emphasized the need for considering them as cascades for understanding and developing[1] them (Karuppusamy and Seenivasan 2001). Similarly, Mosse has considered and used such an approach for his research in parts of Vaigai region to select tank chains for socio-ecological analysis (Mosse 2003).

Since there are many tanks and they are spread out across a large area it becomes necessary to find at what scale one must choose to study the systems. In irrigation engineering, dividing a river basin into macro, meso and micro basins of manageable sizes is widely followed around the world. Such divisions are made

[1] DHAN Foundation in India, a non-government organisation involved in tank development programmes for the last two decades presently follows a chain of tank approach with a belief that individual tanks in a chain must be developed along with their common supply channels.

based on the hydrological connections established through the streams and tributaries of rivers. Numerous land, water and irrigation development projects are implemented based on such an understanding around the world including India. The technical assumptions made in studying water systems in a basin is the *primacy of hydrologic or watershed boundaries* rather than the administrative boundaries defined by history. In the recent years, such a classification is also used to rehabilitate tanks under the projects funded by major donors and governments[2].

Also, classifying micro and macro is not an alien idea even in sociological studies. The environmental anthropologists and ecological anthropologists have used such an approach to examine the relationships between humans and their environment across time and space. See for a discussion on the growth of micro-macro nexus in studying societies in (Bennett 1998). The emphasis of theorizing from different levels of study is debated and both the micro and macro levels are well appreciated by sociologists. As Geertz said, the goal is to have "a continuous dialectical tacking between the most local of local details and the most global structure in such a way as to bring them into simultaneous view (Geertz 2008, 69)'. This research does take both a micro and macro views of tanks and dependent communities.

In order to have a proper view of 'global and the local' Geertz, proposed "a continuous dialectical tacking between the most local of local detail and the most global structure in such a way to bring them into simultaneous view (Geertz 2008, 69)". This research considers categorizing the interconnected tanks for studying the sociological phenomena of tank conflicts into three levels based on the *hydrologic boundaries*.

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[2] IAMWARM programme funded by the World Bank to the Government of Tamil Nadu has such an approach in dividing the basin into several sub-basins that are constituted *by tank cascades or chain of tanks*. Source: "Sub-basins selected for the project" http://www.iamwarm.gov.in/1year-subbasins.asp [Accessed 20 December 2013].

They are:

1. Macro-level conflicts: Conflicts occurring at a regional level within a basin-say between lower and upper regions within the basin
2. Meso-level conflicts : Conflicts occurring between cascades, conflicts occurring between tanks within a cascade
3. Micro-level conflicts: Conflicts occurring between areas serviced by tanks (locally) or within an area serviced by a single tank.

However, an equal importance with the political boundaries is also given and hence the integrity of the analysis will not be affected by these classifications. As the macro level case study of Vaigai will show the hydrological division of Lower and Upper Vaigai exactly coincides with the colonial divisions of the country based on land settlements into *ryotwari* area (upper Vaigai) and *zamindari* area (Lower Vaigai). In law, *ryotwaris* are considered 'the government area' and huge investments for unprecedented engineering projects were made throughout the colonial rule by the government. On the other hand *zamindaris* were considered estates held by landlords or deposed small kings, and investments made by them in irrigation are rare. Rather there were many legal deterrents for them not to do such irrigation developments because of government monopoly over all waters.

This research treats all the interconnected components of tanks including the tank bunds, sluices, weirs, *ayacut*, field channels, supply channels and rivers together as part of an integrated tank system. Conflicts may occur independently and jointly in these components. All of them are considered as tank conflicts. The conflicts arise in each of these three situations may have some common elements but may differ in its content, form and consequences.

The following terms are used and clarified here to place the discussions in context. When conflicts arise within a tank area they are called *intra*-tank conflict. When it arises between tank areas they are called inter-tank or *intra*-cascade.

When conflict arise between two tank cascades they are called inter cascade conflicts.

Intra tank conflicts are between the individuals or groups of farmers located within an area serviced by a tank.

Inter tank conflicts arise mostly due to getting water into their tanks from the common supply channels used by the tank cascade. Most inter-tank conflicts are also *intra* cascade conflicts

Inter cascade conflicts – When single diversion structure (*anicut*) is shared by two different cascades there could be conflicts.

Intra regional conflicts – when a river is shared by distinct social and political regions there could be conflicts arising due to interventions elsewhere. Many cascades could be affected and involved.

2.4 CASE STUDIES AND STUDY SITES

Case study as a research strategy is adopted (Yin 2008). I have taken a historical and empirical approach in preparing these case studies of these three levels of conflicts from the selected sites. These studies explain how and why conflicts arise in these three typologies, based on the analysis of historical documents, interviews with users and personal observations. The selection of Tamil Nadu is based on the extensive existence and practice of tank irrigation in the State. Also being part of the former Madras presidency, tanks found in most of Andhra Pradesh and parts of Karnataka had same or similar laws governing them even today. Hence the selection has its usefulness in understanding tank conflicts in other parts of the country.

The following criteria are used to select these study sites:

i. Basin or the region must be known to be an intensively tankfed area

ii. Existence of long drawn conflicts involving many questions of law, and technology
iii. Some amount of past literature and research must exist on these selected areas
iv. Modern technological Interventions in irrigation inside the selected area should have occurred.
v. There are policy interventions affecting the tanks that lead to conflicts.

Based on the criteria (**Table 2.1**), the following sites are chosen for investigations.

Table 2.1. Typology of conflicts chosen for study

Typology	**Study site(s)**	**Nature of Conflicts**
Macro level	Vaigai basin	Water conflicts affecting the Lower Vaigai region with hundreds of tanks due to technological and management interventions on the river elsewhere
Meso level	Kothai *anicut* system	Water conflicts affecting two tanks and the cascade
Micro levels	Around 12 court cases used	Conflict for water, trees, tank space, fishery, at individual tank sites.

The study sites, conflicts, and source of documents are given in Annexure 2.

Macro level case study

In chapter 7, I look at the Vaigai basin, which is known to be a tank intensive basin with over 2000 tanks that benefit from the river and its channels. The technological sophistication is known and appreciated from the writings of many engineers. About the basin, Voelker reported ‘all the tanks have been made that can be made’ in Vaigai area (1893, 80); Nelson remarked “Wherever, water may be, seen, it is quite sure to be water that has been stored up artificially [in tanks]” (1868, 20 part I) and F. Cotton said Vaigai should be a model for water development in other parts of India (1901, 28). Modern technological interventions in the basin include: construction of Periyar reservoir and altering the hydraulics of ancient Peranai *anicut* to supply water to tanks in Vaigai basin (Mackenzie 1899); 'River modernization and river control' of Lower Vaigai (Mohanakrishnan 1997, 175–176); and World bank funded 'first major attempt [in canal modernization] in India' (World Bank 1986, 1)'. Studies in sociology and history in the basin include the study of *zamindaris* of Sivaganga (Dirks 1986; 1993); *zamindari* of Ramanathapuram (Price 1994); and socio-ecology of tanks in parts of Vaigai (Mosse 2003).

Meso level case study

Chapter 8 looks at Kothai *Anicut* system (KAS) in Varadhamanathi, an ancient tank fed area. Technological interventions in KAS include building up of a modern reservoir in 1975. Other major interventions by the government and private include: conversion of a large tank bed for a bus stand in 1994; dumping of municipal sewage and debris inside tanks (1975-2013); and encroachment for 600 houses and various establishments (after 1975). Significant number of protests by farmers in the chain of tanks since early 1960s to save the tanks, and series of litigations between the farmers and the government to save the tanks.

Micro-level case study

This is done based on 12 selected tank conflicts seen from court litigations. Of these number, six are from Vaigai basin and the rest from adjoining basins. The micro level case studies are chosen from visits to courts in Madurai, Manamadurai, Mudhukulathur and Virudhunagar. Over 100 court cases are noted from the suit registers of which 12 complete case bundles were collected for further reading and analysis. From these, nine of them are discussed in this micro-level case study.

The Vaigai case study is constructed using archival documents, government orders and correspondences, government reports, original project documents related to the major interventions, judgements related to major disputes, court petitions of the ongoing litigations, farmers' petitions to government, pamphlets and other literature generated by the agitating farmers, and technical and engineering reports made by government departments, consultants, and research institutions.

Archival work for Vaigai case study was done in Tamil Nadu state Archives, Chennai and in British Library between 2010 and 2012. Reports related to Vaigai reservoir and Varadhamanathi were availed from the respective PWD offices in Madurai and Palani. Rules of reservoir operations and recent correspondences were received from the PWD offices in Chennai and Madurai. Case bundles of ongoing cases related to Vaigai and Palani were received from the litigants and their counsels in Madurai High Court. Minutes of important meetings related to Vaigai reservoir were received from the personal collections of S.M.Ratnavel and DHAN Foundation offices. The field visits, archival work and discussions with farmers, lawyers and other groups fighting cases for all the case studies were done in two stints during 2010 and 2011.

2.5 Focus Group Discussions and Interviews

In order to supplement and complement other data collected (Annexure 2) for constructing the detailed case studies personal interviews using a questionnaire (Annexure 6) with experts (Annexure 7) and other active village leaders (Annexure 8) were conducted. These individuals with their detailed knowledge on tank development programmes and running court cases offered valuable insights into the origin, growth and status of tank conflicts. Especially interviews with individuals who were organizing and running court cases and protests were highly useful to understand the process of mobilizing farmers and litigating in courts for tanks.

Focus group discussions were conducted in 13 villages where tank conflicts are noticed and ongoing. These discussions were guided by a list of questions (Annexure 3) and were used to understand the multiple dimensions of tank conflicts that are intertwined with local village dynamics such as feuds between neighbouring villages (Annexure 4 and Annexure 5). When the discussions are combined with analyzing the village maps (of 1:5000 size) offered how and why the incomplete records in them become a cause of conflict. Based on the discussions, map reading and walk through surveys Figure 1.8, Figure 1.9, and Figure 1.10 were constructed and used in the study.

Necessary approvals by the University's ethics committee were received for conducting the interviews and group discussions. Most of them were voice recorded and referred to in the discussions.

The search for data related to case studies was based on visits to archives in Tamil Nadu State Archives (TSA) Chennai, British Library in London, PWD offices in Chennai and Madurai.

2.6 HISTORICAL AND DISPUTE FOCUSED APPROACH

Throughout this research a historical approach was followed because the law that governs tanks came after colonization of India at various points over the last two centuries or more. Washbrook observed while studying the historical processes through the study of law that, "…it is not possible to study it only in the courtroom. It is essential to trace the arguments and forces displayed there back to their various origins and consider their situation in the general social context (Washbrook 1981, 650)". Therefore, in order to trace the development of the law it is necessary to understand (i) the land settlement processes and (ii) various technological interventions in irrigation during this period. The law affecting tanks (as is practiced) emerged mostly as part of the colonial land settlement policies, and judicial interventions by courts. The statute law affecting tanks are comparatively minimal and the administrative law that came up through bureaucratic standing orders remains the most significant law dealing with the multiple uses of tanks, its water, irrigation, fishery, forestry and various other usufructs. On both accounts the law continues to be fragmented, compartmentalized and stagnant with limited changes since colonial times.

Therefore, a historical approach is taken to find the process in which the law came about as it stands today. (Chapter 5 and 6 deals with this aspect of law)

Disputes[3] surrounding water and tanks are social realities, and this requires a deeper understanding. In many ways a disputes-focused approach "seeks to isolate and study a particular social relationship called the dispute"(Trubek 1980, 489). The approach is a response to practical needs of understanding the tank disputes that are typical. Each of the disputes discussed here is a lawsuit where precious resources of the parties and the court are spent. An empirical approach in law is needed because my research is concerned with the contextual questions about law. A non-doctrinal socio-legal approach is taken to study the law in a broader social and political context. Going beyond the mere interpretation of law in books, it is attempted to see why and how such conflicts arose in the first place (Chapters 7, 8 and 9 deals with the disputes).

[3] Disputes and conflicts are treated synonymously in this research.

3. LAW, TECHNOLOGY AND CONFLICTS IN TANKS: THE GAPS

3.1 INTRODUCTION

This literature review provides a background, the past and present debates surrounding irrigation in general and tank systems in particular. It aims to highlight the gaps that exist in literature about the study of conflicts in tanks and understanding the role of law in dealing with this traditional technology system in general and specifically in conflicts. Technology includes the applied scientific knowledge and skills that are consciously implemented. The technique forms the material aspects of the technology such as equipments and tools.

Irrigation is the major use of tank water that generates numerous conflicts and hence a brief background of tank irrigation in the study state and its status is provided. The differences in viewing tanks as a mere source of irrigation as against its multiple uses including ecosystem uses is highlighted to understand these conflicts in a holistic manner. The tank as an irrigation technology system is old and has witnessed different types of conflicts of which we have some records and hence some historic conflicts are perused here. The role of the State, and the Communities of users in the past and present is a study of much interest among scholars and practitioners linking various theories related to Water and State, Water and Institutions and Water and Conflicts and they are reviewed here. The present legal environment in which these systems operate is also discussed to highlight the gaps in knowledge in the water conflict studies.

3.2 IRRIGATION AND THE TANKS: A CONTEXT

Water is an essential requirement for animal and human life, used by many for different purposes, of which irrigation is the most prominent. In general, increasing the productivity of crops is a function and benefit of irrigation. For example, Vaidyanathan estimated that in Vaigai basin (that is discussed as a case study in this research) the average output per unit of irrigated land is 3.9 to 4.7

times that of the rainfed lands (2001, 52). In order to fully appreciate the issues surrounding the water conflicts, the dynamics of irrigation has to be first understood. Irrigation is an artificial application of water to ensure higher productivity of land in areas where it is inadequate. In monsoon dependent countries, as Fukuda summarizes, “the necessity of irrigation is determined by the amount of rainfall during the period when plants most need water; thus demand for irrigation depends on the relation between the seasonal distribution of rainfall and temperature (1976, 45)”. Thus the need for water in a rainfall dependent country like India remains a crucial factor for most livelihoods. In India, there are huge variations in geography and rainfall and hence water requirements vary. The subcontinent on the whole has had a long history of developing different irrigation techniques to suit these variations in its geography and rainfall. Myrdal (1984) classified the irrigation techniques in Indian subcontinent into three broad categories: surface water based canals, ground water based wells (*kares and qanats*) and tanks. Along with this, many environmental and ecological functions are served through irrigation (1984, 92). As Fukuda summarizes, “Irrigation and drainage relate not only to moistening, but also to fertilization, temperature control, pesticide and insecticide, desalinization, weeding, and so on resulting in the control of general environmental conditions (Fukuda 1976, 3)”.

Tanks of Tamil Nadu and studying them

Strangely, in countries like India, apart from droughts, the floods are also a reason to develop water storages. Droughts are due to shortages in rainfall that makes crops to suffer and hence irrigation is “man’s response to drought” to “reduce the uncertainty that nature presents” (Maass 1978, 1). On the contrary, floods in most of Tamil Nadu are of local in nature and originate from local rainfalls in the immediate catchments. The abundant availability of water in a short span cannot be utilized unless it is stored, and hence needs storage space. Tanks in Tamil Nadu thereby offer a solution both ways as drought mitigators as well as flood moderators.

In Tamil Nadu, tanks are widely found in all major soil types except for the sandy coastline; found in all topographies except for the steep mountain slopes, and function well in all major agro-climatic zones. These local reservoirs are usually formed by normally constructing a bund across the slope to capture and store the water. The structures of tanks include (i) bunds to dam the water; (ii) sluices to let and regulate water into field; (iii) weirs to regulate and safely dispose the floods and surplus waters; (iv) the supply channels to bring water from the catchments or streams or rivers into the tank. The tanks are found widespread[1] in varying sizes and shapes. Though they are mostly in semi circular shapes with a bund on one side holding the water, there are a few tanks formed in odd shapes. The command area or the *ayacut* lies just below the bund (Ellis 1963; Shanmugham and Kanagavalli 2005).

The structural designs of tank components vary due to many reasons of which geographical, hydrological and social settings are the predominant ones. The bunds tend to be longer in length in the plains when compared to undulating terrains. Bigger tanks have well stabilized bunds at times pitched with boulders and have well built sluices and weirs. However, many smaller ones are rudimentary and have small bunds without weirs and in a few cases even without a sluice. Many tanks are linked with each other in order to either receive or drain supplies and hence are hydrologically linked. Those tanks that are linked among themselves are called group works(Reynolds 1906), or a chain of tanks or tank cascades (Sakthivadivel, *et. al.* 1996). A chain of tank may end up in a river or a major stream. Natural drainages are also altered to practice inter-basin transfer of water in many river basins in Tamil Nadu (Mohanakrishnan 1997; Ratnavel and Gomathinayagam 2006).

[1] In the southern coastal districts of Ramanathapuram in Tamil Nadu, an average of 1 tank per every 2 sq.km or less is noticed. On the whole, Tamil Nadu has an average of one tank per 3.33 per sq.km.

Though most tanks are interlinked, it is not reflected in the way it is understood and dealt for its technical and revenue administration and management. A sectoral approach based on the size of tanks, reservoirs and departmental divisions are still practiced since the days of the British. Scholars and development organizations continue to plead for treating tanks as integrated systems, or at least as a watershed or a chain of tanks to understand them properly (Vaidyanathan 2001). The problem of dividing them along these lines is a limiting factor in designing tank development projects[2]. How deep and wide one must go to understand the tanks is a serious methodological gap in studies focusing on tanks.

Status of tanks in Tamil Nadu

In 2001, India had around 556,000 tanks with a potential of 6.27 Mha (Million hectares) of irrigated area, of which around 3 Mha is lost[3]. An analysis made by Vaidyanathan (2001) reveals the following:

- In India, 60 per cent of all area under tank irrigation is in three south Indian states of Tamil Nadu, Karnataka and Andhra Pradesh; 70 per cent of the total ayacuts of tanks in these three states is concentrated in 19 districts (out of total 60 districts in south India).
- In Tamil Nadu, nearly two fifths of tanks have smaller *ayacuts* (of less than 20 hectares); and more than half of them serve less than 40 hectares. Less than 2 per cent of the total number of tanks served *ayacuts* of more than 200 ha but in aggregate nearly 25 per cent (256,000 ha) of the state's tank irrigated area was served by them (2001, 7).

[2] A range of recommendations from engineers, scholars and NGOs are available in many forums to desist dividing them on such narrow lines for tank rehabilitation and development. Some of them shall be found in the conference and networking proceedings of organisations working for tanks published by Anna University and CDF (CWR 1993) and (Shanmugham 1996).

[3] Source: "Minor Irrigation Census of India." Available at http://wrmin.nic.in/micensus/mi3census/chapter5.pdf [Accessed on 29 November 2009].

In the study state of Tamil Nadu, an analysis of the trends in tank irrigation done by Sivasubramanian & Gandhiraj (2009) show the following:

- In 2007, there were 41,260 tanks reported functioning;
- 15 (out of the total 29) districts in Tamil Nadu have 77 % of total number of tanks in the state and have 94 % of tank irrigated area. Again 50 % of this area is found in 4 districts;
- Between 1960s and 1990s, there was no change in average rainfall but the area served by tanks decreased by about 0.3 million ha.
- The decline in tank areas shows no correlation with 'perceived failing' or deficient rainfall. (2009, 28–31).

To place in context, between 1960 and 2008, the tank irrigated area has come down from 0.733 Mha (40 % of the total irrigation) to 0.506 Mha (18 % of total[4] irrigation) in the state. The decline of irrigation under tanks is a secular trend while the other sources such as wells show an increase and the phenomenon is state-wide except for a few districts like Ramanathapuram where ground water is not available. These two studies cited above also investigated the manifestations of the decline using macro data as well as through extensive field surveys (Vaidyanathan 2001; Sivasubramanian and Gandhiraj 2009). Similarly, from the perceptions of tank farmers and engineers working in tank programmes others report poor maintenance of tanks and channels, the lack of local participation, encroachments and poor enforcement of existing laws as the reasons behind the decline (Seenivasan and Kumar 2004).

[4] Source: Season and Crop Report (2007-8), Department of Economics and Statistics, Government of Tamil Nadu. Available at http://www.tnstat.gov.in/seasonandcropreport2007-08.pdf [Accessed on 11 January 2011].

Tank administration and classification

All tanks in the state are the properties of the government[5]. The tanks with a command area of more than 40 ha and some system tanks (receiving supplies from reservoirs) are put under the Water Resources Organization-Public Works Department (WRO-PWD)[6] for maintenance, repairs and management. Panchayat[7] Unions, the block level local governance bodies are responsible for attending to the smaller tanks with less than 40 ha of *ayacut.* Panchayat Unions shall levy and collect usufructuary (right to use) charges for the trees, silt, earth and other produces from the tanks but in practice the Land Revenue Department carries out such functions. Water management at every level is the responsibility of the tank farmers. The Land Revenue Department collects taxes from the tank water users, and is responsible for the protection of tanks from encroachment and other improper uses. WRO-PWD and the Panchayats receive funds for development works in tanks. Fishery, Forest, and Mining departments and the elected representatives are involved in some more development and regulatory functions[8]. These actors neither report nor interact with each other and have

[5] Sociological research conventionally distinguishes the government and the state. However, in India for historical reasons in the statutes the distinction between the government and state do not exist. Statutes continue to use the government synonymous with state. In this research no distinction is made between state and the government.

[6] Since 1852, Public Works Department (PWD) exists and had a separate irrigation establishment within. After 1995, under a World Bank sponsored reform programme the PWD has been renamed as Water Resources Organisation-Public Works Department (WRO-PWD).

[7] Panchayat means local councils. A discussion about establishing Panchayats as local government is taken up in section 3.8.

[8] As an example, in the case of an operational tank cascade named Vallakulam Tank Cascade covering eight tanks irrigating 395 ha in Ramanathapuram district, the following actors, departments and offices are involved: 6 informal village assemblies, 4 Panchayats, 2 Block Development Officers, 2 Panchayat Union Engineers, 2 Thasildars, 5 Village Administrative Officers, 2 Public Works Department Offices, 1 Agricultural Engineering Office, 1 Fishery Department

other departmental responsibilities besides tanks. Thus administration and management of tanks is a complex function and a delicate subject involving many actors. The non-cooperation or lack of coordination of these agencies themselves has a bearing on the performance of tanks and hence the tank conflicts (Sharma and Selvaraj 1999).

Classification of tanks is done in many ways in the last two hundred years. Initially, the colonial government termed these systems as Minor Irrigation (MI) even when they used to service larger irrigated areas compared to the canals in south India. Depending on the source of water from their catchments they were also called 'isolated works' or 'chain works'. They were also called 'system tank' when they get water from a canal, or a dam or *anicut* or a river; and a 'non system' tank when they depended on an ephemeral rivers or streams. They were also classified into 'rainfed' tanks if rainfall is the only source of the tank. Added to the technical classifications, there are other definitions based on the ownership (private, government, *zamindari, inamdari* etc.,); management (PWD tanks, Revenue tanks, Panchayat tanks); servicing villages (single village or multi village tanks), and agronomy -dry or wet crops (Palanisami and Easter 1983).

Many studies have examined which of these tanks perform better and found the bigger ones managed by PWD perform better (Palanisami, *et. al.* 1994; Palanisami and Balasubramanian 1995; Palanisami and Mainzen-Dick 2001; Palanisami 2006). However, the interconnected aspects of small and big and administrative divisions do not find a place in these studies. The many definitions, classifications and studying them based on such exclusive technical and administrative aspects to date are an indication of the complexities involved in tank studies. This research explores closely the conflicts that the various classifications generate in law dealing with such administrative classifications.

Office, 1 Forestry Department Office, 1 Member of Parliament, 2 Members of Legislative Assemblies (MLAs) (Sharma and Selvaraj 1998).

3.3 THE MANY WAYS OF VIEWING TANKS

There are many ways in which tanks could be viewed other than being sources of irrigation.

Tanks as Ecosystems

Going by the definition of the Ramsar Convention on Wetlands[9] every tank qualifies to be a 'wetland ecosystem'. By this classification, tanks could be the largest man-made inland wetland[10] ecosystems in India. This comprises water bodies, tank structures, field channels, supply channels, wells, wetlands, tankfed dry lands, soils, plants, animals, birds, aquatic plants and fishes etc. In addition tanks do provide a range of 'ecosystem services[11]'. The primary service of tanks is water for all living beings; and the secondary services include forestry (timber wood and trees), health (human well being through generating a cool micro-climate in a hot country), biodiversity (tanks have a range of flora and fauna), and a source of economy with Institutions and established norms and rules of operations. The basic understanding about whether tanks are manmade or naturally occurring is still plaguing the scientific and academic research. Even with several documentation and historical evidence the National Wetlands Atlas of

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[9] Article 1 of Ramsar Convention on wetlands define: "Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". Ramsar Convention documents, available at http://www.ramsar.org/cda/en/ramsar-documents-texts-convention-on/main/ramsar/1-31-38%5E20671_4000_0__ [Accessed 09 August 2013].

[10] The manmade wetlands in India include tanks of Deccan, the freshwater lakes and reservoirs from Gujarat eastwards through Rajasthan and Madhya Pradesh; jheels in the hills of northeast India and the Himalayan foothills (Scott 1989).

[11] MEA defines, "Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation and disease; supporting services such as soil formation and nutrient recycling; and cultural services such as recreational, spiritual, religious, and other nonmaterial benefits (*Millennium Ecosystem Assessment* 2005)"

India 2011 considers many thousands of large tanks as naturally formed lakes showing the level of misunderstanding in classifying them (Seenivasan 2013).

There are several studies related to quantifying economic benefits of irrigation systems including the tanks. However, there are very few studies that report and quantify the ecosystem benefits comprising biodiversity and all other connected benefits. IUCN's study of Sri Lankan tank systems (2005) could be one of the first to report about the ecosystem uses of irrigation tanks and raise awareness of the ecosystem importance of tanks. Scholars who studied the 'ecography[12]' of tanks report that the policy and reality in general in India and particularly in Tamil Nadu view the tanks as mere sources of irrigation and the ecological benefits of water bodies, plants, animals, birds, and fishes are not considered. They suggest that the conversion of tanks into other uses such as housing, and abuse of tanks by dumping urban and industrial pollutants need to be stopped. They also seek the government to consider their ecological services to 'man and nature' as an important contribution (Sharma 1996; 1997).

However such recommendations are yet to find any place in national or international policy or practice. Even the global effort of Millennium Ecosystems Assessment (MEA) in 2005 is yet to take notice of the present status of tanks, their ecosystem contributions and issues of conflicts plaguing them in south Asian countries where they are still a predominant source of water and livelihood. The MEA has not even strayed into understanding the status of the widespread existence of tanks when compared with its many detailed assessments of natural ecosystems such as the forests, oceans and mountains. As against the MEAs avowed intentions of creating a benchmark of wetlands, not even the basic documentation of tanks are collected or compiled or proposed. As an example, an elaborate study on the linkage between the wetlands and food security by the

[12] Ecography is understood as a study of population and community ecology, biogeography and ecological conservation.

International Water Management Institute (IWMI)[13] did not even mention tanks as ecosystems in their report. The background documents[14] for the report surprisingly have just two stray references to 'tanks'. But not about the tank wetlands that are found in India and Sri Lanka where a large contingent of their water scientists are placed. The level of understanding about tanks as wetlands at times borders on ignorance of the existence of these systems, and leaves a big void in the knowledge related to ecosystem uses of them.

The courts in India[15], in a few, rare cases involving tank conflicts in the recent years started to consider the contribution of environmental and ecosystem uses of tanks to man and nature. However they are not consistent. In many other cases[16] involving tank conflicts such an understanding was ignored by the courts.

Tanks as a multiple use system

There could be many other ways of looking at the tanks. Tankfed agriculture is different from canal irrigated areas with differing cropping practices, varieties,

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[13] Source: "Ecosystem services approach to water and food security." Available at http://www.iwmi.cgiar.org/Topics/Ecosystems/PDF/Synthesis_Report-An_Ecosystem_Services_Approach_to_Water_and_Food_Security_2011_UNEP-IWMI.pdf [Accessed 20 June 2012].

[14] Source: "Background documents: Ecosystem services approach to water and food security." Available at http://www.iwmi.cgiar.org/Topics/Ecosystems/PDF/Background_Document-Ecosystems_for_Water_and_Food_Security_2011_UNEP-IWMI.pdf, (p xi-xii) [Accessed 20 June 2012].

[15] In *T.S.Senthil Kumar v Government of Tamil Nadu, [2010] Writ Law Reporter 113*, the Madras High Court referred to the RAMSAR convention treating the tank in dispute as an 'ecosystem to be protected'. In *L.Krishnan v State of Tamil Nadu [2005] AIR Madras 311*. The Madras High Court prevented that the conversion of tanks into Housing complexes citing the ecological use of tanks that might be required for the future generations.

[16] In *Susetha V The Union of India [2010] CDJ MHC 4613,* the Madras High Court did not accept such an argument even after a scientific committee of technologists and engineers reported that the disputed tank is an ecosystem that needs to be protected.

and water management and can be called a distinct agronomic system. Tanks have mostly informal associations, representatives and workers to attend to different functions of tank management and a Management system. As property systems, tanks have complex regulations and user regimes, they are the largest common properties next only to the strictly guarded reserved forests. Even though parts of tanks are government property the customary rights are provided to shepherds to graze and water their animals in tanks; potters to collect earth; farmers to take silt and dry their crop produces. These are codified in the Revenue BSO.

Tanks also provide many more uses through water and the land space. Some tend to call them as 'resource complexes' rather than just a water storage structure for irrigation (Ambler 1994). The tanks recharge the groundwater and sustain millions of wells (for drinking and agriculture) in hard rock areas where recharging through surface storage is a necessity. Tanks also act as vital source of inland pisciculture, cultivation of vegetables in tank beds and grazing. The livestock depends heavily on tanks as a grazing ground and source of drinking water. In many areas, tanks remain as a major source of water for drinking, bathing, washing and other domestic uses. The tanks also lend social and cultural space for local management thereby nurturing local action in the villages in living and working together as a community (Palanisami and Mainzen-Dick 2001; DHAN Foundation 2002b).

Whatever be the initial motivations for establishing tanks, the multi-utility of the systems have brought a range of environmental and ecological modifications in the landscape. Hence, treating tanks as a mere source of irrigation water would be an incomplete proposition. This research deviates from them to the extent to include some of these important uses (silt, sand, trees and fishery) to understand the conflicts it generates.

3.4 TANK AS TECHNOLOGY SYSTEM

Analysing the historic trends in the worldwide development of irrigation technology, Fukuda (1976) suggested that the water technology exchange in the ancient world was in two ways from both directions - from east to west. According to him, parts of India may be one of the earliest to use and adopt tanks for extensive irrigation[17]. Inscriptions deciphered and interpreted in the recent years from *anicut*s (dam) across the rivers supports such a possibility. The oldest of a Tamil inscription was found on a construction across a river is dated to the 5th century A.D indicating the widespread practice of tanks and *anicut*s even at that time (Rajan 2008, 18). However, some scholars consider "Sri Lanka's dry zone is the only ancient irrigation culture that can boast of an unbroken history of local management of village tanks for rice irrigation over millennia (Shah *et al*. 2013, 58)".

Earliest references to tanks can be found in Tamil poetry and Tamil grammar dating back to the first century BC or before. For example, *Thirukkural* depicts the importance of rain, springs and tanks in some details. Thirukkural has a chapter of ten couplets each on rain (no.11-20); on agriculture (no. 1031-1040). Direct references to water is found in 16 couplets that covers technology, management and administration. It equates water as - the elixir of life and reiterates water either creates or ruins men and civilization. Archaeologists, epigraphists and historians citing numerous inscriptional evidences believe sophisticated networks of tanks were extensively formed and functioning well before the seventh century A.D in many parts of Tamil Nadu (Srinivasan 1970; Sampath 1980; Krishnan 1998; Ramasamy 2008).

[17] Fukuda wrote, "The Western trends in irrigation technology originated in Mesopotamia in 15th century B.C; by 9th century B.C, the technology got introduced in Algeria and Morocco; by 6th century B.C, Greece introduced the technology (tunnel surveying in Rome); by 100 A.D the Romans extended the technology into Western Europe. Justinian code recognised the importance of irrigation in the economy; in 7-13th centuries A.D, the Arabs (Moors) developed irrigation works in Morocco and Spain; during 15-16 centuries A.D, Spain and Portugal introduced the technology into South America and the Philippines. The eastern trends started in about 2000 BC and about 1200 B.C irrigation started thriving in many parts of India (1976, 33)".

Studies on ancient townships of Pandiyas and other regional kingdoms in Tamil Nadu tend to show that even the localization of villages and towns were said to be based on irrigated commands of tanks (Tirumalai 2003, 1:8). Most, if not all the technical words for structures that are currently in use for sluices, bunds, weirs, and channels and their components are traced in these inscriptions. Almost all of the present day terms used to connote tanks and tank structures are found in literature and inscriptions showing they were in continuous use over a long period without any change (Rajan 2008, 10).

Records in the form of inscriptions and poetry depict various types of irrigation works in rivers like Cauvery and Vaigai in south India. They show a trend of establishing flood control measures and simultaneously developing storages for irrigation since 7th century A.D. (Ludden 1999; Srinivasan 1970). The South Indian historian Nilakanda Sastri (1966) summarized: "The importance of irrigation was well understood from early times; dams were erected across streams and channels taken off from them wherever possible. Large tanks were made to serve areas where there were no natural streams, and the proper maintenance of tanks was regularly provided for" (1966, 328). According to K.Shanmughan there are 116 large tanks with a capacity of over 3 Million Cu.m storage capacity found in Tamil Nadu. Of these, only six are built after twelfth century A.D (Shanmughan 1995, 74–82). It is appropriate to conclude that the networks of tanks has its long history and fits to be called a traditional technology system that is functioning well.

Formation of tanks

The engineering of the tank systems, storages, runoffs, designing weirs, sluices and their tank performances were studied by many scholars (Abeyratne 1990; Sakthivadivel *et.al* 1996; Sakthivadivel *et.al* 1997; Keller, *et. al* 2000; Panabokke *et.al* 2002). However, literature related to the technological understanding of tanks and their networks including *anicuts*, channels, sluices, weirs etc. remain far fewer compared to the recent water systems such as dams, wells and deep bore holes. Complete literature related to the tank technology as understood in the past are not available in full. Inscriptions from the Royalaseema region of Andhra Pradesh provide a glimpse of forming certain types of tanks (Srinivasan 1970, 320). However such details are sketchy, available in bits and pieces in several inscriptions that were yet to be fully understood and explained by technologists.

An etymological analysis of a copper plate inscription by Zvelebil Kamil describes a Tamil village of 6th century A.D (between 550 and 575 A.D). The village given a grant for setting up of a school for some teachers in north Tamil Nadu resembled a tank-dependent village of today. The village had the following within its boundary: two irrigation tanks and one feeder tank; paddy fields cultivated by tanks and wells; dry lands cultivated by garden crops, vegetables and millets; brackish low land; the tank foreshore used for grazing; forest with hard wood trees at the foot of the hills and in tank foreshores; a network of feeder channels from rivers, supply channels for tanks, and field channels bringing water from sluices; wells and springs; dwelling houses; house gardens and a nearby stream from the hill (Zvelebil 1964).

Who would have built these tanks is an often repeated question in debates related to tanks. Literary evidences from Tamil poetry shows construction of new tanks and bringing lands under irrigation was the role of a king, which led to forests being converted into agricultural land[18]. For example, a poem titled 'Water and Land[19]', sets a vision for a victorious Pandiya king to develop land and construct tanks as a measure of ensuring food to his subjects. Similarly inscriptional evidence describing the role of kings in making tanks are found in hundreds of inscriptions belonging to various periods starting from the first century B.C. Equally there exist hundreds of inscriptions detailing the role of

[18] Pattinapalai, (lines 283-284: *Kadu kondru naataakki*, *kulamthottu valamperukki*) describes converting forests into agricultural lands with irrigation tanks.

[19] Purananuru, (Poem 18 by Kudapulaviyanar, dated between 600 B.C to 300 A.D) says Food equals land and water (*Undi enappaduvathu nilathodu neerae*)

individuals and village assemblies undertaking tank development works in a collective manner (Vani 1992). Many tank sluices even today bear inscriptions describing their creators, benefactors and the nature of the work. Intensive studies of analyzing inscriptions in compact areas such as Pudhukkottai and Madurai regions in Tamil Nadu present a better picture of tank-related administration, details and grants made by the rulers, trade guilds, temples and the communities. These grants were made for construction, maintenance, and management of tanks; excavating new channels and linking tanks with nearby rivers; desilting of tank bed and channels; raising of the tank bunds; enlarging the existing tank storages and so on. (Rajan 2008; Tirumalai 2003).

Further, documentation and analysis of traditional Panchayat systems and tanks by Dharampal (1972), Mukundan (1988) and Vani (1992) have informed us that the communities, traditional village assemblies and Panchayats held varying rights of ownership: to sell and buy water; *ayacut*; rights to levy taxes from users; manage and control the tank revenue from its various usufructs; and leisure. From the available evidence, it is appropriate only to suggest the tanks came into existence through the combined efforts of the state, private land owners and communities with differing roles and responsibilities for each of them.

Several descriptions of the tank irrigated areas of Tamil Nadu are found in early government reports, manuals, gazetteers and memoirs. Appreciation of tank related technologies are found in many colonial writings and reports. Arthur Cotton suggested using the technology elsewhere in British colonies such as Australia (Cotton 1900, 46–49). Frederic Cotton (1900) spoke to his fellow engineering faculty about tanks in Vaigai basin and on choosing decentralised and smaller storages in the form of tanks. He felt this should be ‘exactly the principle on which the great rivers’ in India to be dammed (1901, 28). Nelson (1868) provided a vivid description of the vision of ancient rulers in going about the formation of tanks across Vaigai and Gundar basins covering an area of over 15,000 sq.km in Tamil Nadu. He believes they had a vision to view the basin as a whole and interspersed all possible areas with tanks and tank chains (1868, 19 part 1). These descriptions and observations shows a contrary picture to the present day claims made by some noted historians, anthropologists and other sociologists. As an example to cite, Edward Leach, the noted anthropologist widely cited in tank studies most famously wrote,

> The major [Indian type of] hydraulic works are not created rationally and systematically but haphazard as pieces of self advertisement by individual leaders. But once started, such constructions survive and can be enhanced by later adventurers of the same type (Leach 1959).

Leach made this conclusion to counter the theory of 'oriental despotism' proposed by Karl Wittfogel using his anthropological work done in tankfed villages of the then Ceylon. It is very difficult to accept a proposition that these came in an irrational, non-systematic and haphazard manner survived over for hundreds of years. Discussions in this research about the Vaigai basin in chapter 7 show that there existed a good deal of technological understanding in forming tanks across an entire river basin.

3.5 THE DICHOTOMIES AND MISCONCEPTIONS

There are several misconceptions about the tanks in general amongst academics and policymakers. They include: the tanks are small, tanks are traditional, tanks support certain societal form, tanks are meant for water intensive crops and tanks are meant for irrigation.

Traditional and Modern

As Eric Stokes (1973) pointed out 'traditional and modern' are one of several dichotomies that continue to create a stereotypical and an inferior image of south Asian systems, culture and civilizations. According to him,

> "The science of history proceeds no doubt as the detailed criticism of sociological generalizations, but of generalizations so rudimentary and so little analyzed that they constitute primitive archetypal images lurking in the background of the historian's consciousness rather than a formed system of ideas" (Stokes 1973, 136).

For some reasons tanks continue to get such a characterisation in the established literature. Dhawan (1999), a notable among the Indian irrigation economists in his self-proclaimed ‘life time work of half a century’ wrote thus: “The days of tank irrigation seem to be over. The sustained and pervasive decline of an area under this source of irrigation is an unmistakable pointer to our contention (Dhawan 1999, 26)”.

How do we define something as traditional or a modern system? Tanks are referred as traditional system in literature (Sengupta 1985; Mukundan 1988; Agarwal and Narain 1997). Many of the commonly understood notions of modernity (bigger in size**,** complex technical arrangements, and mechanical sophistication) apply to tanks but yet they are called traditional. Many tanks are much bigger[20] than many of the present day (built after the nineteenth century) medium irrigation[21] dams and have complex arrangements to get, distribute and dispose water. Most of the presently functioning tanks in Tamil Nadu were created between the 7th and 14th centuries A.D, well before the modern era. Therefore, the only notion of traditional that substantiates the term is the long time use.

Sengupta (1985; 1993) argued modern and traditional in irrigation is not much to do with the technological aspects of the systems, rather how amenable they are to establish ‘centralised power and control’ by the bureaucracy. For him, “Some of the old water appropriation systems, understood and adopted by the engineers came to be known as 'modern' techniques. The rest which did not attract them, were regarded as 'traditional'” (Sengupta 2007, 121)”.

[20] For example, Veeranam tank in Tamil Nadu built in 10th century AD has an irrigation command of 18,513 ha and bigger than many medium size dams in India.

[21] Indian reservoirs are classified based on their command areas as: small (<1 000 ha), medium (1 000 to 5 000 ha) and large (> 5 000 ha).

Social shaping of technology

Scholars building on the logic of 'technology is not class neutral in its social outcomes' have argued that tanks as a technology do show a similar trend. Shah (2003) based on her work in Karnataka summed up her research by saying "tank designs are coded with dominant interests that structure water distribution in a certain fashion and maintain social order…it (the study) illustrates how social arrangements or the social order around water distribution are reproduced through reproduction of designs (2003, 23)"[22]. Going by her assertions, the social changes in the last thousand years and more in south Indian areas should have brought changes in the irrigation designs of tanks. However it is not the case in all the places. For example, Sivasubramanian (1995) analyzed the water management practices in two ancient tanks named as Dusi-Mamandur and Kaverippakkam which together served a total of 32 villages in tank intensive Palar basin in north Tamil Nadu to find out social and water management changes. He used the land holding details of first (1882) and the third and current (1983) land settlement records, and a book of customary water management (*mamulnama*) dated 1815. His investigation shows that the land owning castes, the land owning pattern, the social order and village polity has changed substantially during this period[23]. However the study found that no changes in the way water was

[22] The sources for such conclusions for Shah come from the study of historical formation of various kingdoms of south India such as Ludden (1985) and Stein (1980). These studies, leaving aside the study of class and social formation of those times did not go into the 'technical appropriateness' associated with different types of irrigation systems and structures - such as Tanks, Channels, and *Anicut*s.

[23] Dusi-Mamandur tank has an *ayacut* of 4118 acres. The land ownership percentages in the *ayacut* by different castes in 1882 and in (1983) shows: Brahmins – 46 (7); Mudaliyar -39 (22); Naicker- 3 (51); Pillai – 2(4); Scheduled Castes 1(8); Others – 7 (9). Numbers in parenthesis represents the data of 1983, the third and current land settlement. Similarly, Kaverippakkam tank has an *ayacut* of 6397 acres. The changes in land owning pattern of castes between 1882 and 1983 shows: Mudaliyar 64 (31); Naicker 13(31); Brahmin -10 (3); Reddy- 3(8); Pillai – 3 (6); Scheduled Castes- 1 (11); Others- 7 (12). These ownership data clearly shows that the higher castes of the past such as the Brahmins and

delivered, and the tank had the very same structures, water management practices and the *ayacut* (Sivasubramaniyan 1995). This tends to show that the tanks do function the same way technically[24] and water is managed in the same lines irrespective of the prevailing social arrangements[25] over the last two centuries for which records exist in written form. Since vast majority of tanks remain as they were formed several centuries ago, there is less reasons to conclude a 'certain social order is produced and reproduced by means of design (Shah 2003, 16)'.

Tanks and Paddy cultivation

Shah (2003) also found that one of the main determinants in evolving the technological design of tanks is the advent and extension of water intensive paddy crops (2003, 261). It is generally true that the present form of paddy

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Mudhaliars sold their lands to the middle castes like Naicker and the Scheduled castes.

[24] It is not my case to say that there is no change in tanks. Many sluices are fitted with screw gear shutters replacing plug and rod types in the name of increasing efficiency. The results of such changes are highly questionable and not much is known about its effect. Personal experience shows these changes do not have any effect on the basic designs of the various components.

[25] Even after such profound changes in the land owning pattern among different castes (implying social changes) in the intervening period of one century, Sivasubramaniyan recorded: "Interestingly, regulation of water supply below the tank sluices and within the *ayacut* is still performed on the basis of procedures laid down in the *Mamulnamas*. However, most *ayacutdars* are unaware of these teachings (Sivasubramanian 1996, 60)". Although it is not available for all tanks in Tamil Nadu, Sivasubramaniyan could trace a copy of the recorded custom printed in 1815. It should be noted that, the printed copy of the *Mamulnama* precedes the first land settlement made by the British in 1882 in this part of the Madras Presidency, giving rise to the belief that the Colonial engineers and revenue officers wanted to record and understand all possible details of major tanks. The government in these two tanks (later in the beginning of the nineteenth century) experimented with instituting user organisations. This is the period in which decentralised administration of villages and resources were being debated seriously. See section 3.8 for discussions on decentralization efforts through 'partnership models' in tanks.

cultivation is water intensive. However not all paddy varieties and methods (such as SRI) are water intensive. There are also semi-dry paddy cultivation practiced in traditionally tankfed areas like Ramanathapuram. Most tanks in this region offer 'protective' irrigation[26] rather than a complete wet paddy cultivation. It may be the case that tanks in the past centuries could have come into existence to promote different types of paddy crops as well. There would have been choices about its use to have a fully wet paddy or semi-dry paddy. Academic and agronomic research in this area is negligible and creates a misunderstanding that tanks are designed mostly for wet paddy crops requiring continuous irrigation.

This research avoids these different misconceptions and explores tanks as hydrologic networks and studies the conflicts.

3.6 THEORIES ON WATER AND STATE RULE

Water remained an important subject in helping to understand the societies and their configurations throughout the ages. This section explores how tanks have been theorized and the many unanswered questions in understanding them. Theories emanating from studies on irrigation and water vary widely, however they all indicate an important role for water development in societies. Studying large scale irrigation works in Asia, Wittfogel in his famous theory of 'Hydraulic Civilizations' concluded centralized and large irrigation networks in 'landscapes characterized by full aridity' form the basis of political institutions and hence the civilization itself (Wittfogel 1957, 109). According to him, the design and running of large scale irrigation systems that requires transfer of water from one region to another, and extending into huge geographical areas are made possible only by having a centralized state. These states according to him invariably were despotic

[26] I refer to protective irrigation because the tank offers less than four wettings on the whole. Transplantation is rarely done and mostly paddy is sown. Thereby, monsoon is used to start the crop and tanks are used later to supplement the crop when the fields become dry.

and bureaucratic in order to mobilize huge labour forces to accomplish such networks.

The first major contentions came from Leach (1959; 1961) who studied tankfed villages in Sri Lanka and offered an alternative explanation to this view. Even with an intensive anthropological and historical work Leach could not appreciate the technological sophistication in these systems. He said these tank networks “are not created rationally and systematically but haphazard as pieces of self-advertisement by individual leaders (1959, 24)”. He rather unconvincingly attempted to substantiate how such haphazard works could have survived for centuries by saying “...such constructions survive and can be enhanced by later adventurers of the same type (1959, 24)”.

Wittfogel’s theory is again contested by many scholars with the help of case studies from all over the world including arid areas in south Asia and southern Europe. Studies on traditional irrigation systems in Indonesia by Geertz (1972) and southern Europe by Maass (1978) showed that the irrigation institutions for construction, maintenance and management varied greatly. There is no relationship between the spread (and existence) of irrigation and the nature of the form of the State. Further these well advanced societies could not be claimed to be fully centralized, bureaucratic and despotic. Rather they were shown to be decentralised, locally managed and not despotic. In case of tanks, such a view is also substantiated by many inscriptional and other evidence relating to tanks that describe efforts of communities in forming and repairing tanks.

However, Wittfogel’s theory is still appealing and provides an explanation for the existence and spread of large scale irrigation works and the role of State. Many started interpreting Wittfogel’s determinants in different ways. For example, Boyce (1988, A16) considered the ‘local elders’ or the elites of the decentralised villages as an equivalent of a dictator or a despot required in making successful irrigation systems. Gunawardana (1971) using Sri Lankan tank networks as examples argues the ‘gentry and monastic institutions’ could create a hydraulic society depending on a series of tank networks spanning most of Sri Lanka. Similarly, Mosse (2003) suggests institutions (local and supra local) and the elite together, has a definitive role and argued 'water is integral to the historical making of regionally specific institutions' (Mosse 2003, 4).

3.7 TANKS AS COMMON PROPERTIES

Another important area of academic and policy debate relevant to tanks are the Common Property Resource (CPR) debates. Tanks though are held as government property it is also understood as a Common Property Resource (CPR) belonging to many sections of the society. Definitions of a common property vary greatly and are often confusing. A broad explanation of what may be called a common property that is of relevance to our discussions is taken from Robert Wade (1987) who studied Indian irrigation. According to him, exclusive possession (freehold) is one extreme on a continuum of property rights. No property, as in ocean fisheries or the atmosphere, is the other extreme. In between, lies the common property, where the rights to exploit a resource are held by persons in common with others. These rights may take a variety of forms: they may allow unlimited exploitation for those within a specified group (as in commercial fisheries under national jurisdiction, until recently), or they may stipulate limits on exploitation for each user (as is commonly the case for commercial fisheries today, or as in 'stinting' of a grazing commons) (Wade 1987b, 96)

While studying the performances of CPRs many scholars have also dwelt on the conflicts occur in them (Maass 1978; Ostrom 1990; Agrawal and Sivaramakrishnan 2000). The concerns of these discussions vary. They mostly focus on management, development and sustainability of the CPRs, assessing the collective action of the users and performance of Institutions, the role of state and the communities and so on. Tanks differ from most of CPRs like forests, oceans and hills because they were manmade and artificial creations. They are legally held as properties in law throughout the history and enjoyed jointly or collectively by the users. Conflicts in these Tank CPRs are widespread and at times lead to the detriment of the resource itself.

Hardin (1968), concerned about the overexploitation of the common property resources (CPR) such as grasslands, concluded that they would eventually be destroyed because of the users' urge to individually maximize their returns. He concluded that the resources must be regulated by any external intervention by the State. Hardin's parable of the "Tragedy of Commons" in many ways initiated an array of theoretical discourses on common property resources (Hardin 1968) related to their management, governance and other institutional aspects. Liberal economic scholars argued the market is such an external agency in the place of the State. For example, Demsetz (1967) advocated introducing private property rights in every possible manner so that the CPRs be enjoyed based on market principles. For historic reasons, neither the extremes depicted by Hardin did not happen, nor the solutions suggested by liberals arrived in India until this time. At least this is the case of tanks.

Several scholars including Wade (1987a; 1987b), Ostrom (1990; 1992) and Sengupta (1991) argued against Hardin's thesis and propositions in order to prove CPRs shall be successfully managed by user communities when cooperation and collective action are put in place. With the help of case studies on forest, fishery and water, these scholars argued that voluntary collective action and efficient management of CPRs are very common around the world as against Hardin's proposition of the tragedy. They inform that managing (including the conflict resolution) of CPRs through a set of rules - formulated, enforced, and monitored - through the collective action of the users is very much possible and advisable. They do not emphasis on any external agency (state or market) to intervene in managing the CPRs but rather want to stimulate collective action through suitable interventions.

This argument of 'collective action and management is possible' also supported by a section of economists studying the performance of formal and informal

Institutions including tanks. For example, Bardhan (1989; 1993) concluded that even when there are conflicting interests among the water users for their own economic interests they might voluntarily organize themselves into managing these CPRs. Hence, the tragedy of commons may not be a practical reality. Studies that explored when, where and how such collective action worked well by analyzing case studies of irrigation provide many insights.

Wade (1987) after studying villages (in Andhra Pradesh) involved in irrigation and grasslands concluded that the conditions for collective action are determined by the 'environment' on which they operate. According to him, the likelihood of successful organisation depends on the following: i) The resources: smaller and well defined; ii) The technology: higher costs such as costs of exclusion of certain users; iii) Relationship between resources and user group established by the ; iv) Location, users' demands and their knowledge; v) User group: smaller in size, defined boundaries, relative power of conflicting groups, institutional arrangements to resolve disputes, users obligations to be bound by decisions, punishments for offenders; vi) Noticeability or ease of detection and the relationship between users and the state (Wade 1987b, 104). In a way, he emphasized a form of 'ecological determinism'. In the case of water resources this determinism depends on the specific hydrological and locational features that provide the economic basis for collective action; the state governance does not necessarily ensures sustainable use of common property resources, and hence farmers may better manage irrigation functions in these systems. Similarly, Vaidyanathan (1999) suggested that the institutional form and effectiveness of irrigation systems need to be understood from the 'context of the agro-climatic, technological, and socio-economic environment in which they operate' (1999: 45). By taking an evolutionary perspective he said, "the way the (irrigation) system is designed in effect reflects the state of knowledge, techniques, skills and prices, as well as the interests of various groups involved at that time (Vaidyanathan 1999, 46)". Mosse (2003) considers 'the tanks as an Institutional whole' and takes a view different from Wade. For him, tanks can be considered "an Institutional whole, confounding the dualistic separation of economic-political and religious-cultural spheres. The irrigated landscape is not just a productive and symbolic resource today. It is also a route to the memory of the power of kings, warriors and earlier forms of state (Mosse 2003, 1)". His study of the tank irrigation in southern districts of Tamil Nadu argued that the 'ecological determinism' as Wade proposes may not be the case, rather the tank irrigated landscapes need to be 'engineered' by the technical vision and political exigency of the times. These academic discussions do appreciate the technological requirements to bring such engineering possibilities and reconfigure the landscapes. However, they do tend to think it '*as a local phenomenon*' in smaller geographies and do not visualize that it is possible in a larger geographic area like a river basin and beyond. This research contradicts such a notion of 'local' and see this as a technological phenomena spanning a whole geography.

3.8 DECENTRALISATION AND TANKS

Decentralisation is understood as "the transfer of authority and responsibility for public functions from the central government to intermediate and local governments or quasi-independent government organizations and/or the private sector --is a complex multifaceted concept (World Bank 2001)[27]." For a very long time in India, decentralization of administration and governance of natural resources has been a subject of extensive discussions and debates particularly in relation to local government. There is very little change in the structure of the colonial administration which first imposed a centralized state structure on a decentralized communitarian economy (Kumarappa 1945). The decentralization debate in present times does not advocate reverting to pre-colonial models of economy, society and governance, if such a thing were possible. Rather it seeks to transfer limited authority and responsibility to local governments within the plenary powers of a federal constitution and a centralized bureaucracy. Top-down

[27] "What, Why, and Where of Decentralisation" available at http://www1.worldbank.org/publicsector/decentralization/what.htm [Accessed 24 august 2014]

efforts at decentralization come from the government in India and they are broadly classified into two distinctive models as 'Partnership models' and 'Local government model' (Baumann and Farrington 2003).

Local government model

The assumptions behind decentralization of government are many and vary. In India, the efforts on decentralization may be traced to the East India Company (EIC). The EIC in 1854 set up a 'local fund to administer local infrastructures' like the roads and water systems in Madras presidency. The fund had an objective of maintaining the infrastructure locally. In 1882, Lord Ripon, the viceroy of India brought in a 'Local Governance Resolution' and was considered a major watershed. This policy suggested having local governments to share the role of administering and governing the country and its resources. With reluctance, three tier local governments (Panchayats) were mooted through *Madras Local Boards Act 1884* in the Madras Presidency. These three boards are at the level of the district, *Thasil* (sub-district) and village. In 1920, two new legal enactments came in and they were (i) *Madras Local boards Act 1920* (replaced the 1884 Act); and (ii) *The Madras Panchayats Act 1920*. The Panchayat Act had listed Minor Irrigation that includes Tanks as one of the role of Panchayats. These Panchayat Boards survived for fifty years and were wound up in 1934. The government exercised control over these Panchayats through its various inspectors from the Revenue Department such as the Collectors, Revenue Divisional Officers and *Thasildars*. After the transfer of power from the British, a new law named *Madras Panchayats Act 1950* was introduced to replace the 1920 Act. Even at this stage, the powers of Inspectors to control Panchayats remained as it was in British times. An opposition leader in the Madras legislative council mocked these bodies as "Panchayat by the provincial government and their officers (State Planning Group et al. 1997, 6)". By 1958, the Madras legislature debated a white paper to find out why decentralised governance and administration could not be achieved even after so many laws? Then came another law called *Madras Panchayats Act 1958*, which was amended 30 times in 39 years mostly to curtail the aim of the law and to incorporate powers of inspectors in controlling Panchayats. The 73rd and 74th amendment to the Constitution of India in 1992 amended the constitution to making, amongst other things, water supply and sanitation a local government subject. As water is a state subject, Tamil Nadu enacted, another law named as *Tamil Nadu Panchayats Act 1994* to give effect to the constitutional amendments. This law is currently in force and has three sections related to Minor Irrigation that include tanks.

In its long history, politicians of all hues supported decentralised government. Of this, the Congress led by M.K.Gandhi was the most prominent and wanted decentralized Panchayat bodies to govern villages and its resources (Gandhi 1984; Dharampal 2000a). They were joined by politicians from home rule movement (Iyer 1917; Besant 1918). Lately, the seekers of effective local government include the Communist Party of India (Marxist) [28],and the World Bank (2000). However, as we know from many committees to study the decentralization in India, none of them seem to be serious in accomplishing it.[29] What is important to note here is that going as far back as the East India Company's rule decentralization in India has always been a top-down effort to improve the functioning of an essentially centralised state. In other words it has been part of an internal administrative reform agenda rather than a transfer of real power to people.

In 1996, the State Planning Group led by L.C.Jain was appointed by the Tamil Nadu government to suggest the 'powers to be given to Panchayats'. The group had this to say:

> More than hundred years of Panchayats brings up the following issues: (i) Levels of decentralisation and magnitudes of democratisation varied

[28] "Thirty years of West Bengal government" available at http://www.cpim.org/content/thirty-years-west-bengal-left-front-govt accessed 12 September 2014.

[29] See (Mathew 2000; World Bank 2000) for a comprehensive review of efforts in decentralisation in India.

> from period to period; (ii) Throughout the past periods Panchayats were considered agency to provide certain basic amenities and infrastructures in their area; (iii) Right from the days of Lord Ripon, financial constraints limited the operational flexibility and viability of the Panchayat Raj Institutions. These were dependent upon government grants. Now the situation has not improved. iv) Government has exercised enormous control over the local bodies in the past. Similar control, if not more still exists in the new dispensation. Inspector of local bodies has sweeping powers. Deputed government officers will be birds of passage with least dedication for the new role being assigned to the local bodies; (v) The fact that elections were not held regularly undermined the democratic principle in the local bodies. Safeguards are needed to avoid the supercession powers enshrined in the Act (State Planning Group et al. 1997, 9).

Their observations apply to the State of Tamil Nadu as much as the other states.

The Partnership Model

Irrespective of the poor functioning of Panchayats many tanks in Tamil Nadu have some form of local organization. Well organized tank farmers associations are found in Tamiravaruni basin in southern Tamil Nadu. Gomathinayagam and Sophia (2003) have documented some of these tank associations called *Oppadi*[30] Sangams. Their work shows Peikulam Tank Farmers Association in Iruvappuram was founded in 1872, and is functioning with substantial finances and manpower and manage their tank. The Association's major activity include crop planning, water management and offering agricultural technical services to members. The association in its long existence had handled several conflicts, conducted court cases and argued with the government functionaries. The authors also report that this is a basin wide phenomenon. There are 201 villages in the basin and 66 of them have well functioning tank associations, of these 28 are formally registered as societies. All in all 30 associations, have a distinction of functioning for more than fifty years without any dormancy. The phenomena is also observed by them in the adjoining Manimuthar basin where such associations are found in most of

[30] *Oppadi* in Tamil also means 'In Agreement'.

the basin villages (Gomathinayagam and Sophia 2003). These associations work mainly through the cooperation of their members and have limited or no legal recognition under any of the irrigation laws.

In the last thirty years a range of schemes such as Command Area Development Programme (CADP), European Economic Community (EEC) funded Tank Modernisation Programme, Watershed Programmes under different schemes have promoted many user groups or farmers associations in tanks. They do claim to decentralize the resource management. However, they face issues of legal recognition that limit their capacity for decentralized resource management functions and they lack the powers to deal with government bureaucracy especially the Land Revenue Department.

It is equally important to note that these decentralization efforts under the participatory model did not devolve legislative and budgetary powers (over land and water) to Panchayats. Instead Panchayats remained under government control and oversight.

3.9 ROLE OF INSTITUTIONS

The role of institutions and the performance of irrigation in various situations is an important field of academic interest. Region-wide studies in Asia focusing on water management by Coward (1980) attempted to define the basis of irrigation organizations, and highlighted the role and importance of local participation in irrigation. Proponents of interventions such as Bromley & Cernea (1996) contended that a process of 'destabilized Institutional environment' made these CPRs into an open access regime in which the 'rule of capture' drove each one to get as much they can before others did. According to him, the dissolution of local institutions of the past has not been followed by establishing more effective institutions and the national governments have not adequately substituted for these former resource management regimes (1996, 7). So, his belief is that there is a need for new water management Institutions to be put into place.

Since 1980, a range of programmes variously called participation in irrigation management (PIM) and irrigation management and turnover (IMT) came into existence in countries like India, Philippines and Sri Lanka (Vermillion 1991). These projects based on the assumptions of achieving socio-economic improvements through irrigation management transfers by establishing Water Users Associations (WUA) provided a positivist attitude towards bringing up the local participation in government programmes. However, most of these projects did not attempt any major changes in the legal arrangements that govern irrigation systems. In India, along with large canal irrigation projects tanks have also been included in such projects for experimenting with the transfers (Shivakoti *et. al* 2005). Many interventions through organising or reviving the erstwhile local community organizations (such as Water Users Associations) sprang up using CPR theories.

Studies by Brewer et al (1999) and Gulati et al (2005) assessed the achievements of such local participation and management in command area development programmes and found minimal successes. They emphasise on institutional strengthening of farmers' organizations through suitable programmatic and legal means thereby touching the basic requirements of having a legal environment in the first place. These studies again called for more than 'correcting the government policies' (A. Gulati, *et. al.* 2005, 228). They implied there exists fundamental problems in the law that governs these systems. These studies also revealed the transfer and participatory programmes did not define the rights, responsibilities and duties of the state, its agencies and the users in clear terms and suggested three different *legal changes*: compelling provisions to include the obligations of the agency and the user; enabling provisions to vest authority on government to act in certain manner; and removal of constraints in the irrigation Acts (2005, 196).

The role of law thus in creating and allowing such institutions to exist and perform is not adequately explored in many of these studies and programmes. They tend to ignore the fact that the existing laws related to tanks in specific and irrigation in general is a creation of an administrative tool by the bureaucracy over the last two centuries allowing limited changes in them (See Chapter 5 and 6). The continuing failure of CPRs is a concern even for those scholars including those who even disagree with Hardin. Scholars feeling the ‘disconnect’ between the modern science and indigenous knowledge systems expect common property systems to undergo further damage unless the societies themselves keep and uphold the self-imposed ‘checks and balances’. Vandana Shiva (1988) said “The breakdown of such a community, with the consequent collapse of the principles of common ownership and shared responsibility, spells progressive degradation and the eventual ruin of common resources. This is happening in most third world countries (Shiva 1988, 241)”. These scholars place the onus for such failures of the communities and commons on the ‘reductionist[31]’ modern science and programmes based on that approach.

Similarly, Scott (1999), an opponent of the modern state and an anarchist, argues that high modernism[32] adopted by the modern state as the main reason for ‘condemning the common properties’. He believed that, combined with state simplifications[33] and authoritarianism, the state devices and implements in

[31] According to Shiva,

> The ontological assumptions of reductionism are: a) that a system is reducible to its parts; b) that all systems are made up of the same basic constituents which are discrete and atomistic; and c) that all systems have the same basic processes which are mechanical. The epistemological assumptions of reductionism are: a) that knowledge of the parts of a system gives knowledge of the whole systems; b) that ‘experts’ and ‘specialists’ are the only legitimate knowledge seekers and knowledge justifiers (1988, 233).

[32] For Scott, “High modernism is thus a particularly sweeping vision of how the benefits of technical and scientific progress might be applied – usually through the state- in every field of human activity (1999, 91)”.

[33] Scott believes,

programmes that ignore practical knowledge. Scott concluded that the 'practical knowledge is ignored and pitted against scientific explanation' which is in a way leading to their decline.

This research again explores (in Chapter 7) the usefulness of these concepts through specific and elaborate case studies where how such local knowledge is ignored leading to the detriment of large number of tank networks in Vaigai.

3.10 DECLINE OF TANKS AND TANK INSTITUTIONS

The decline of tank irrigation in the last three decades is explored differently through taking an Institutional approach as well. Studies by sociologists aiming to understand the existing formal and informal Institutional arrangements identified many factors for good and bad performance of Institutions (Janakarajan 1989; Janakarajan 1993; Palanisami and Balasubramanian 1995; Vaidyanathan 1999; 2001; Sivasubramanian and Gandhiraj 2009; Sivasubramanian 1996; MIDS 1986). The many factors include: break down of the existing tank institutions in the villages due to social changes; physical factors such as improper maintenance, poor financing and poor upkeep of channels and tanks, unabated encroachments; technical factors such as the growth of wells, tube wells, changes in crops etc, in tank command areas. These studies emphasize the factors as discrete but interrelated. For example, tanks with poor local institutions tend to do poor maintenance of channels and hence leading to its poor performance. However they did not go beyond what is observed in the everyday life of the farmer and

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> State simplifications have at least five characteristics that deserve emphasis. Most obviously, state simplifications and observations are observations of only those aspects of social life that are of official interest. They are interested utilitarian facts. Second they are also nearly always written (verbal or numerical) documentary facts. Third, they are typically static facts. Fourth most stylised states are also aggregate facts. Aggregate facts may be impersonal (the density of transportation networks) or simply a collection of facts about individuals (employment rates, literacy rates, residence patterns). Finally for most purposes, state officials need to group citizens in ways that permit them to make a collective assessment (1999, 80).

the tank system without exploring the larger issues that prevent the communities. Vani (1992; 2002; 2005; 2009) attributed the absence of local participation, local management and poor Institutions are due to the lack of conducive legal environment in the country.

Non-governmental organizations working for tank development add some more reasons for decline of tanks and they point to: uncontrolled corruption in project implementations; ‘isolation’ of the government agencies without the involvement of farmers; improper planning and implementation of tank development works by the agencies and contractors; delivery approach of the government combined with favouritism in development works; lack of integration within the government departments; poor respect for the customs, customary rights in tanks for the farmers and communities (Seenivasan and Kumar 2004). In summary, a range of reasons are attributed to the decline of tanks. This includes reducing macro level investments on tanks, current legal framework that govern the tanks, non-enforcement of existing laws, unscrupulous encroachments, poor upkeep of the infrastructure, mismanagement by the communities and users and lack of communal involvement and general apathy about the government schemes. See the proceedings of seminars organized by Anna University (Anna University 1982; CWR 1993) and CDF (Shanmugham 1996).

However, there are also doubts raised about whether there is any decline of tanks at all especially their environmental decline. In a study of southern Tamil Nadu tanks, Mosse (2003) concluded his research do not support “any general narrative of environmental decline”. Rather he argues, the tank systems are in “better shape today than ever before (2003, 299)”. His conclusions according to him, came from extensive field surveys and intensive archival work on tanks. Similarly, Sakthivadivel et.al have studied the traditional tank Institutions in eight states of India and found “under traditional local management operating at a high level of performance equilibrium” (2004, 3521). While these institutional and social-ecology studies have provided many and differing insights into the probable reasons for the decline of tanks, they have not adequately considered the role of law in dealing tanks as a technology. This research seeks to undertake this through the case study of the Vaigai basin in chapter 7.

Tank conflicts and resolution in history

Tanks are ancient systems of irrigation in India. In tank intensive areas of Tamil Nadu it is found even caste conflicts in the villages have some of its routes in the water conflicts. Though the tanks are smaller in size spanning a few villages in its command, *intra* tank and inter-tank conflicts are also common and reported. Conflicts in sharing water from a single source and disposing of seasonal floods are common. Conflicts among the end users of water in the tanks include contending and competitive uses. The consequences of tank conflicts often lead to damaging of the tanks by breaching the bunds and channels, demolishing weirs and other structures; altering the full tank levels of weirs and thereby reducing storage capacity (DHAN Foundation 2002a).

Conflicts affecting tanks and their resolution are reported in some of the inscriptions dated between 7-14th century A.D. Rights of using particular channels feeding specified tanks were given away to sets of villages earmarking the tanks. Disputes related to land and water throughout the centuries has been reported. Any encroachment over such channels by new comers in any form is considered an offence[34].

[34] Kasakkudi copper plate (lines 115-117) belonging to 7th century A.D records a grant given to a village of Brahmins to draw water from the River Cheyyar and its streams. The village can have rights to excavate feeder channels, drainage channels in order to feed and drain their tanks. Anyone breaking into these channels by bailing water using buckets or *mhotes* or lifts, and diversions made through temporary channels were expressly prohibited and punished. Similar inscriptions from the same period are found in the same region (Pullloor inscriptions line 126-128). Cited in (Santhalingam 2006, 7)

Nagaswamy (1971), by analyzing some of the inscriptions[35], concluded that ownership on land and disputes surrounding land ownerships existed as far as back in 8-9th century A.D. The dispute resolving mechanisms on land and water according to him was based on certain legal principles widely known to the communities. The village assemblies resolved such disputes, and appeals were sent to the King. "Whether the ruler was a Pallava, Pandya, Chola or other Chieftain, there was an administrative uniformity, in respect of villages, guilds, civil courts etc., all deriving their authority from the Dharmasastras (1971, i)". The kings as supreme judges decided on the appeals from the village assemblies or disputes between different assemblies, related to ownership based on the evidences[36] and the customary principles.

Based on several inscriptions from southern Tamil Nadu dating between 7th and 14th century A.D., Tirumalai (1981) had identified the following disputes that were typical in tanks: sharing of water, tank fishery and remitting taxes to the king between the temple administration and the village assembly; demarcating boundary of the tank and the village between two adjoining villages; sharing water between temple lands and individuals; sharing water between upper and lower tanks; sharing a common supply channel between two adjoining villages. According to him, these conflicts and disputes were settled using the legal principles of custom and practice. Extension of irrigation is always done while protecting the existing users with necessary safeguards and wherever the rights of prior users are infringed seriously the decisions are reverted with payment of damages (1981, 150–152).

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[35] Nagaswamy, the archaeologist and epigraphist considers and treats inscriptions as *Dharmasastras.* Normally Dharmasastras are understood as scriptures dealing with both religious and non religious matters in Hindu custom.

[36] Evidences in any dispute resolution included human (documents, witnesses, and enjoyment-possession) and divine. Different types of documents including deeds of transactions (receipts, sale, mortgage, gift) are issued and reissued from time to time.

Tirumalai (1994) also described a case study of tank water conflict from 12^{th} century A.D using inscriptional evidence. The issue arose out of excavating an upstream canal through a royal order affecting a downstream canal[37] feeding tanks from River Vaigai. The case was resolved using the principle of 'priority for the prior riparians'. The newly excavated canal was dismantled after three enquiries by the King, based on continued observation over a cycle of 12 years. The king heard the same case three times in his 11th, 16th and 22nd year of his rule. Each time, certain relief was given to the newcomers in tax exemption but did not allow them to use the canal. The final decision was in favour of initial users to permanently close the new one. The principle used here resembles the 'doctrine of prior appropriation'[38].

Tirumalai who was also a senior bureaucrat having extensive service in irrigation compared this 12th century conflict with a similar conflict that arose in 1960 in the same river in an adjoining site and the priority of the previous users were not considered while making a decision by the then government[39.] The procedure[40]

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[37] The three royal proceedings are recorded in inscriptions (South India Inscriptions -Vol XIV No. 214:p122; No.223:p127; No.224 p 128; No.229:p132; No.236 p141).

[38] In Tamil the verse reads: '*Kaal mael Kaal khollal aakthu'* roughly meaning 'a new canal (*Kaal*) should never be taken (*khollal aakathu*) above (*mael*) an existing one'.

[39] Tirumalai (1994) observed,

> The competing claims for irrigation as between the established riparian rights and the needs preferred for extension by the less advantageously located lands has been a recurring occurrence in Vaigai basin. This case study affords an early 12th century forerunner of this theme….. The keen attention paid to water management, canalisation of river flows for wet cultivation and consciousness of water rights and relative priority of the earlier users are all very striking (1994, 123).

[40] "The affected parties made representations either at the capital or when the King was on tour, they could do so *in situ*. The chieftain or high official had to recommend the proper course of action. On the King's oral orders they were recorded, and attested by a minister and a responsible official, sometimes more

according to him in resolving conflicts in pre-colonial India are based on well settled customs followed in many places. The customs and the laws varied from place to place and warranted a deep understanding of the time, space and the actors. He observed the nature of customs as follows:

> Ancient custom, past practice were the basis of enjoyment rights, and an appeal to such practice was decisive. Custom based on the memory of the township was the code of authority and it had acquired, in Prof. Maitland's phrase, an 'indefinite definiteness' in medieval practice and jurisprudence that could not be predicted even by the enacted law of the modern times" (1981, 132). However, those customary methods and principles were not followed during and after the British rule in India[41].

3.11 TANKS, TANK INSTITUTIONS, AND LAW: THE PRESENT AND PAST DEBATES

Academics researching south India including Baker and Washbrook (1975), Washbrook (1981), Baker (1984) have assessed the colonial law, land settlements, its many variants and its economic impacts to understand the historical processes. However, specific studies specializing on water law from a practical angle are of recent origin and started only after the Indian Law Institute study series in the late eighties (Singh 1991; 1992).

These studies also show that laws governing irrigation in general have gone through little change in the last two hundred years. Most of the colonial laws related to water and water rights are not superseded but still preserved without any rewriting, and remain static and fragmented (Singh 1991). Usually court cases involving tanks are dealt by applying laws dealing with easements, encroachments and other departmental regulation such as Board Standing Orders

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than one. Then an *ulvari* an extract of a tax register conveying the royal order of grant was issued. This was confirmed by a communication from the Chieftain, (*Olai*). The attesting officials were also identical and had served the king from the 11th to the 22nd year (Tirumalai 1994, 121)."

[41] *Robert Fischer v Secretary of State For India, [1908] 2 Ind Cas 325 in* the Madras High Court 1908. The court did not uphold this principle and this has been the legal position since then.

(BSO), Public Works Department (PWD) codes, Forest Department regulations, and other mining laws. A coherent irrigation code or any code for water does not exist as these studies have found.

Having a ‘code of water law’ was debated even during the colonial times. Nelson, a legal scholar and a revenue officer lamented about the lack of a ‘code of laws for irrigation’. He said,

> The distribution of supplies is not regulated on well defined principles, but in a very arbitrary manner, and ordinarily by the lowest and most ignorant of officials. And Madura has no code of laws for the better regulation of and management of her works and sources of irrigation, as have Italy and other European countries, although peopled by a race naturally very quarrelsome and litigious. It is to be hoped, that before long some attempts will be made by the Legislature to remedy this crying evil (Nelson 1868, 20 part I).

Even after hundred and forty five years since Nelson wrote his suggestions to have a ‘code of laws as similar to Italy and European countries’ there is no code for irrigation in Tamil Nadu. It is done in the same way as it was done during his times. Unfortunately, those who visited to study those engineering and bring a ‘code of laws’ from Europe also returned empty handed and no useful policy came out of their efforts. Even though Scott-Moncrieff, the future chairman of India’s first Irrigation commission had produced a detailed work on irrigation systems, administration and management as he noticed in southern Europe he failed to offer any workable suggestion to reform the Indian irrigation systems (Moncrieff 1868). Similarly, another senior officer of the Madras PWD visited France, Italy and studied the water laws of these countries. But nothing useful came out of such visits to the benefit of tanks in Madras presidency (Vincent and Madras 1882). Nevertheless, this discussion of having a ‘code of law for irrigation’ continues even today.

Learning from modern European law has its roots in the successful running of the centuries old southern European irrigation systems built originally by the Moors[42]. A perusal of Scott Moncrieff's report and the Italian irrigation code indicate that the central question of ownership, administration, decision making, levy of charges (tax) and political control, Institutions and their powers to control and use water were the key issues to be resolved. In the European systems it was left to the farmers and in India it was kept by the government. The colonial government could not imagine bringing in any changes in the ownership, administration and control of land and water after they have made the land settlements. The reasons were not difficult to guess. The local Institutions or collective bodies were systematically curtailed (Dharampal 2000b). A detailed discussion of the Board standing orders in chapter 5 would show the government control on everything related to water.

The situation has not changed much even today. Presently, the tank spaces (land) that includes water spread area, the tank bund and some extent of supply channels, and field channels are treated as 'government properties' and protected by laws that deal with encroachments[43]. The constitution of India provides power under the State[44], Central[45] and Concurrent[46] lists to bring in laws

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[42] The Arab rulers during 13-14th centuries had established a network of systems called 'chain irrigation systems' in parts of Italy, France and Spain. During the 18-19th century these chain irrigating systems witnessed substantial changes and reforms due to the influence of cooperative and other social reform movements in these countries. See discussions in (Maass 1978; Guillet 2006). The traditional irrigation administrative systems of the past were refined, and written irrigation codes were introduced based on the modern capitalist principles allowing modern collective organizations. The irrigation code for Italy is available along with Moncrieff's own comparisons of Indian and southern European water technologies and water laws of southern Europe (Moncrieff 1868).

[43] *Tamil Nadu Land Encroachment Act 1905*.

[44] Constitution of India, List II of Schedule VII, Entry 17 (subject to Entry 56 of List I).

[45] Constitution of India, List I of Schedule VII, Entry 56

on water. Laws that govern tanks are in State list. The State of Tamil Nadu has around 27 statutes, including amending statutes besides various standing orders issued from time to time on matters related to tanks.

Research on the customs related to tanks followed by the tank communities (including users and non users) have reported that the statute laws often contradict customs and require customs to be proved in a court. Studies by non-government agencies have suggested that, notwithstanding the 'ownership' and 'control' of tanks by the state and its agencies, they are mostly managed by the local people (Seenivasan et al. 2004; DHAN Foundation 2009, 477–510). Even though legal pluralism indicating the use of statutes and customs together is an accepted policy in colonial and post colonial India, the non-statute laws (such as unwritten customs, customary practices, and customary rights) were treated poorly in courts and also by the government. Scholars have argued such a practice of doing away with the customs by the colonial State was to uphold their ‘domination and exploitation’ (Bruns and Meinzen-Dick 2000, 179).

In general, most studies on water law seem to be infatuated with studying mostly the statutory laws passed by the state legislature and the Parliament. They leave out a whole body of administrative law in the form of Board standing orders (BSO) that in reality governs the tanks and the case laws made by the High Court and Supreme Courts. Though the Madras presidency had substantial irrigated area in colonial India it never had an irrigation code but only the Revenue Board Standing Orders[47]. Water is always seen as part of the land administration and

[46] Constitution of India, List I of Schedule VII, Entry 20

[47] Madras Presidency had a Public Works Department (PWD) code that merely reissued the BSO with certain instructions detailing their departmental responsibility related to bigger tanks, rivers, river channels and dams (William Grant 1857). Smaller sized tanks that are at least four times the numbers of big ones are not even part of this code. However, other larger provinces like Bengal and Bombay had their Irrigation codes even in 1876 and 1879 respectively (Singh 1992). A discussion on the history of irrigation laws is available in (Singh 1991; 1992).

done using the BSO in Tamil Nadu. This research explores in some detail about this body of law in chapter 5.

While there is a fair amount of literature available analyzing important case laws, a consolidated attempt is made in this research (chapter 6) to show the role of courts. Many major decisions about the role and rights of the government and users in Indian water law came from judicial pronouncements rather than statute laws. However, as Vaidyanathan and Jairaj (2010) point out there exists "…considerable differences in judicial pronouncements on such basic issues concerning the interpretation of public good, prior appropriation rights vs optimum use, the balancing of competing interests and the status of the 'eminent domain' doctrine vis-a-vis that of 'public trust'". These scholars called "for a systematic analysis of case law on water related issues to assess the underlying principles of judgements (Iyer 2009a, 13)." This research attempts such a systematic analysis of court decisions related to tank conflicts chronologically in the last two centuries in chapter 5 and 6.

Conflicts arise in different situations and occasions. Many conflicts affecting tanks came to the open when the major, medium reservoirs and other head-works were built across the streams and rivers[48] that alter the existing situation. During colonial times such conflicts came as issues between princely states and the British India and later it came as under Inter-state water conflicts (D'Souza 2002). The interstate water conflicts and connected legal issues were studied in Krishna river by D'souza (2006); Cauvery river by Guhan (1993) and Hussein (1972) and connected constitutional and legal issues by Chauhan (1992). However, there is an absolute vacuum in literature about the *intrastate* disputes. Almost all streams and rivers are historically used by tanks and conflicts arose when new projects were floated in them affecting old ones. Many projects like building modern reservoirs, dams and head-works had invited litigations from tanks. However,

[48] In Vaigai basin, disputes were ongoing in courts between lower Vaigai and newcomers in the upper Vaigai; New comers and the old users of Manjalar river.

these conflicts were not studied for its importance and offerings to the systems like the tanks.

3.12 SUMMING UP THE GAPS

Although the tanks are complex technical, social, economic, agricultural systems, the existing studies reviewed here were mostly disciplinary studies limiting their approaches in anthropology, economics, legal studies, technological studies or engineering. Studies that have used interdisciplinary approaches tend to leave the technology aspects to secondary status and concentrated on social sciences. Broadly, the studies on understanding the role of institutions make passing references to connections with the law and systems like tanks. However the linkages between them with the identified causes of the conflicts are not adequately explored.

This research therefore seeks to fill the following gaps in the existing literature:

(i) Methodologically, tanks need to be understood from a large basin level perspective linking the river, streams, *anicuts*, reservoirs, channels and tanks together.

(ii) Tank systems should be seen as rationally and systematically developed technology systems with great understanding of local as well as basin level geographies.

(iii) The law (both the statutes and case laws) remains a source of conflicts without understanding the technological aspects behind these systems.

4. SIMPLISTIC UNDERSTANDING OF TANKS IN POLICY AND TECHNOLOGY

4.1 INTRODUCTION

Understanding tank conflicts necessitates understanding the land and technology policies pertaining to tanks. This chapter aims to show how the tank as a technology is visualized in law and policy that led to different treatment between tanks in different property regimes and sizes. Since the days of the colonial rule, policies related to water in general, and tanks in particular originated from the land revenue policies. The laws that governed them are mostly the compartmentalized executive instructions issued at various points in time by the land revenue officials. Similarly, the technology policies affecting tanks are also made by the same Revenue Department and the Board of Revenue without paying attention to the interconnected aspects of tanks and their components- most importantly the supply channels. This chapter argues that (i) the land settlement policies did not comprehend the tanks as a technology, and created a property regime solely aimed at maximizing the land revenue; (ii) the technical documentation about the tanks detailing their specifications remained inadequate and incomplete since the colonial takeover, and no concerted efforts made to prepare and document them for the betterment of tanks; (iii) in tune with these land policies the tank development policies differentiated between larger and smaller tanks; government and private tanks; and *zamindari* and *ryotwari* tanks.

4.2 TANK, PROPERTY RIGHTS AND TANK INTEGRITY

Strachey, a long time officer of the colonial government wrote the British policy in India is, “to encourage the growth of private property in land….(though) former governments hardly recognized the existence of such property (cited in Khaldun (2007, 11))”. Madras Permanent Settlement Regulation XXV of 1802 legally commenced the process of establishing property rights over land by settling lands in the present day Tamil Nadu. The ideological underpinnings of creating private property rights over land through the land settlements under the British rule is debated by historians in great length. Eric Stokes believes it is the English Whig notions of recognising private property as the basic principle of government (Stokes 1982); and Ranajit Guha believes it is the French physiocratic notions of creating a mercantilist capitalist class in India (Guha 1963). However, there is a general agreement exist among scholars that settlements came into place to promote private property systems in land.

Using this law, different land settlements were held throughout the nineteenth century. A detailed discussion of the origin of settlements and the bureaucracy that spearheaded in ryotwari areas are discussed in chapter 5. Though this regulation of 1802, brought the land settlement process in the presidency, ryotwari settlements that covered most of the Madras presidency areas did not have a specific statute but done solely through executive instructions of revenue officers. However, this regulation is cited as the origin of the settlement process in Madras Presidency. After the transfer of power in 1947, all types of settlements were converted into ryotwari settlements wherein the government deals with landholders directly without intermediaries.

Irrespective of the nature of settlements the law treated tanks (constituting parts of waterspread or the bed, bunds, channels and rivers) as tax free lands[1]. In 1904, in an entirely unrelated dispute between a householder and the government about using a piece of government land, the Madras High Court held penal levies to be illegal, and shall be questioned by a civil court[2], because the land belonged

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[1] Until 1905, the government ownership on the tank beds in *ryotwaris* were not defined clearly, and many individuals used these lands for cultivation subject to some conditions and levies. The situation was the same in *zamindari* settlements as well and whoever occupied tanks (beds and bunds for cultivation) were called occupancy right holders and such pieces of land was called ryoti land. A detailed discussion on the legal aspects of this is discussed in chapter 5.

[2] *Madathapu Ramaya v The Secretary of State,[1904] ILR 27 (Mad) 386*

to government for the purpose of revenue collections alone. The government thus introduced the *Madras Land Encroachment Act 1905* to declare the government ownership over different types of lands including tanks.[3] Since then, tanks have remained as government property. However, this law does not declare every part of the tank as government property. It covered only those areas that are marked as tank in the land survey registers. The registers do not mark every part of the tank as tank lands. For example, many channels connecting tanks running at a distance from a particular tank may be given to private holders. Similarly, parts of tank beds were given away for cultivation on a temporary or permanent basis. It all meant that some parts of the tank remained government property and others private. The settlement thereby did not preserve every component of tank as it should have been. The channels and tank beds became the first victim of this policy. In order to show the effect of such a practice an illustration is provided in Figure 4.1. This plan of Nilaiyur tank would show how ownership in tanks is defined and established. Nilaiyur tank is a large historic tank with over 400 acres of irrigation lying close to Madurai city. It is visible that some parts in the middle of the tank bed belonged to private property and the rest as government property. When the tank gets full, most of this private land will be submerged including the cultivated lands and some buildings in the middle of water.

Like Nilaiyur, there are hundreds of tanks wherein large parts of waterspread areas, foreshores are held in private while the rest of the tank is a government property. A discussion about why and how such private ownership came into is discussed in chapter 5 and 6. Such private land holders came into existence because of the land settlement policy and law. The private land holders may do

[3] Government property means all public roads, streets, lanes and paths, bridges, ditches, dykes and fences, on or beside the same, the bed of the sea and of harbours and creeks below high water mark, and of rivers, streams, *nalas*, lakes and tanks and all canals and water courses and all standing and flowing water and all lands situated are the property of the Government including Railway lands and land in Port limits. (*Madras Land Encroachment Act 1905, s.2(1*))

things that may even be detrimental to the existence of a tank. Those who hold lands lawfully as in the case of Nilaiyur cannot be prevented from doing what they want to. The field work visits have

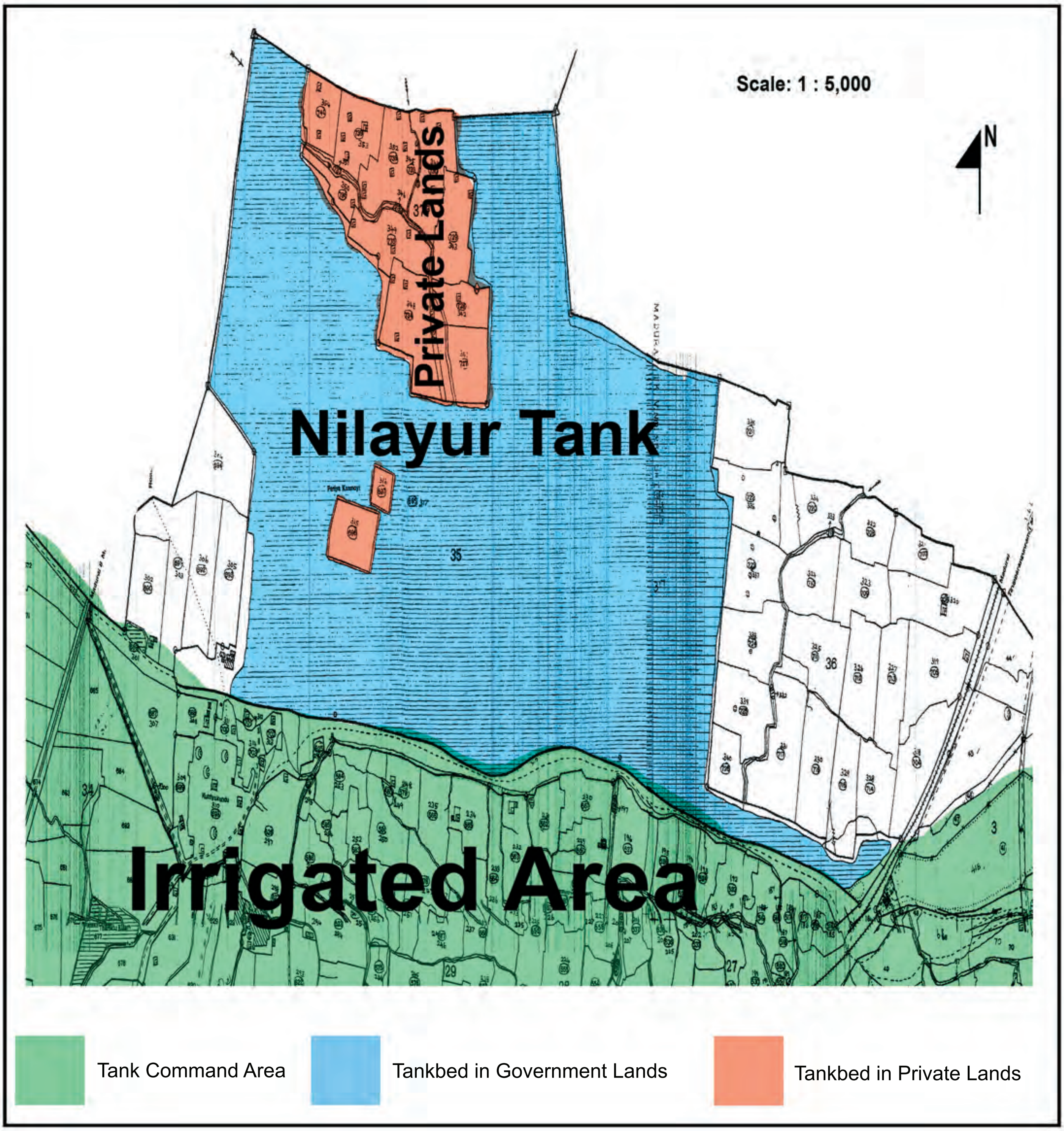

Fig. 4.1 Nilayur Tank in Madurai district showing Private agricultural lands in the middle of the Tankbed

Source: Nilayur Village Map Madurai South Taluk, Madurai district, Directorate of Land Survey and Records (1917)

The figure shows tank beds given away to private land holders even before 1917 indicating the wide spread practice of settling occupency / encroached lands to private individuals. When the tank becomes full, these private lands also get submerged causing distress to the land holders who want to empty the water at the earliest to continue their occupation.This leads to dispute with the water users of the tank who want to keep the water storage.

shown, for almost every tank visited, that the tank bed has to some extent been cultivated or built on with habitations. This phenomena shall be found in many cities and villages. 'Lake area' or 'Lake view' in many cities of Tamil Nadu are euphemisms that they were once tank beds converted into housing areas. At times, householders in these areas want the tank to be empty because it inundates their dwellings. Thus the property definition in law did not take care of the integrity of the tank as a whole when the various land settlements offered tank beds and channels to private land holders. Often, this situation leads to conflicts between the tank water users and the users of the tank bed and channels for cultivation and housing etc., The land holders in the tank beds and channels lawfully claim they were duly settled but the water users may contest them as abusers damaging the tanks.

To understand this phenomenon we shall refer to a historic tank in north Tamil Nadu. Sivasubramaniyan (1995) found that Kaverippakkam tank in Palar basin had its *ayacut* of 2559 ha (during the first land settlement of 1882) reduced to 2341 ha during the third land settlement (held in 1983). He attributed the reduction of 218 ha to the loss of a substantial part of the water spread area to the occupiers in the intervening 101 years. He observed tensions between the foreshore land holders and the *ayacutdars* still exist even after such a long time since the first land settlements. In the same way, in Ramanathapuram district, a study of analyzing the actual tank waterspread as measured by engineering memoirs and the revenue records showed the actual tank bed is higher by 40 % in all tanks. It is reasonable to assume that this much area of the tank beds are given away as private lands over the years even though water stagnates in them in every season (Seenivasan, *et. al* 1999).

Numerous court cases dealt about fixing the 'boundaries of the tank' and in many such cases, the full tank levels (FTL) of tanks were altered in order to suit the land settlement and ensure the extent of private lands, thereby reducing the area of tank beds[4]. Therefore, today it is common to notice the difference between the land marked as water spread (tank bed) in land revenue records and the actual area under water (computed by the engineering memoirs). This results in continued tensions between the tank bed farmers who think that 'their own land' is being 'submerged' and others think their tank is 'encroached' or abused.

To cite how far such conflicts would go on in the courts an example is given here. In a dispute related to an ancient tank named Kadamba tank in Tirunelveli district, the foreshore cultivators and the *ayacutdars* went on fighting a court case to define the boundary of a tank for over sixty years before it was settled by the High Court[5]. The High Court in its order settled what the Full Tank Line of the tank? by looking at the papers (property right documents such as *patta* and other settlement records issued by Revenue Department). Technically, the FTL should have been the boundary line in the rear side of any tank, and hence defines the area of the tank bed. Thus the records created by the land settlements in the preceding decades became sacrosanct and defined the several centuries old tank.

It is appropriate to conclude that the land settlement regulations and the laws (dealing with encroachment of government properties) in spirit and practice did not recognize the tanks as a technical system. Rather tanks are assumed as another piece of land that shall be given away for cultivation without bothering the performance and survival of the tank. As a result, a set of conflicts between those who occupy the beds and those who use the tank for water continues forever. It is also clear that the law, (especially the revenue law that created papers) did not understand the meaning of tank structures when it created them, and the courts did not need to look at any technical issues involved but to look only for what is available in paper. Further discussions about the importance and

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[4] Refer to *Ramasamy Naicker and others v Sangu Reddiyar* (unreported) discussed in chapter 9.

[5] *T.K. Nallamuthu Pillai. v R.K. Thirumalai Aiyangar, [1942] 1 MLJ 49*

relevance of records in resolving tank conflicts that come to Courts are provided in chapter 9.

4.3 INVENTORYING AND ASSESSING TANKS: FROM THE DAYS OF COLONIAL RULE

4.3.1 TANK MEMOIRS

It is not that this phenomenon of giving away tank beds as private holdings is unknown during the colonial times. There were also systematic efforts to understand tank engineering in some detail to redevelop them. However these attempts were half hearted and could not be completed as visualized. Tank surveys initially commenced in the 1850s in tank irrigated areas like Madurai, and by 1883 there were separate Engineering Circles within the Public Works Department (PWD) called Tank Restoration Survey (TRS). The TRS as a scheme "provided for the compilation of a very complete memoir of each tank, giving the standard to be maintained in future (Morgan 2004, 292) ". TRS thus recorded, codified and suggested standards for tanks in the name of Tank Memoirs. The memoir writing circles comprised of accounts of engineers who visited tanks, channels, and *anicuts* and enumerated technical details and prepared and placed them on detailed maps. It was a gigantic task to assess and prepare records for over 100,000 tanks spread in a geographic area identified as 'area with scope', i-e tank-fed cultivated area of 102,500 sq.miles within the Madras Presidency.

It involved tedious work under the sun and rain for days by engineers set on foot. Nearly all tanks and their parts were measured. Exact geographical coordinates of sluices and weirs were fixed with reference to the Mean Sea Levels (MSL). This technical data has around 40 specifications for a small tank and many more for larger ones. It included the condition, area and quantity of runoff from the tank catchment; condition, areal extent, quantity of water stored, maximum and minimum depths of water within the tank; physical conditions of the tank at the time of surveying; scope for further improvement and required specifications to be followed for the future; the MSL of sluices, bunds, weirs, and bottom of tanks and important channels[6].

The references to the datum (or benchmark for fixing any MSL) are fixed locally (usually on the temple sanctums or foundations that are usually unchanged) in order to provide a standard that should always be maintained in all tanks. They were even analyzed up to the levels of river basins and published with extraordinary details and printed on colourful maps. Tank intensive districts in south India such as most of Madura and parts of Coimbatore lying in Vaigai and Amaravathy (Cauvery) basins had their Tank memoirs published with colour maps as early as 1887 (PWD 1887, 66). By 1931, 92 % of all tank-fed areas (constituting 94,600 sq.miles) within Madras Presidency was surveyed and had their memoirs printed (PWD 1931). Titbits based on these memoir data was known around the world and the importance of such technical documentation were realized. Deakin, the future Prime minister of Victoria, Australia, in his study of Irrigated India, said, "A calculation has been in circulation for some years, in which it is estimated that, if the embankments constructed with this end within the Presidency, were added together, they would make a wall of earth six feet high, one and a half times round the globe (Cotton 1900, 66)". The quest for scientifically recording the existing tanks and scope of their future was planned through these exercises.

Though the memoirs preparation is a great effort to record and codify every tank, there were some serious omissions too. The memoirs did not record the details of channels thereby leaving a critical element altogether to the land revenue authorities and their documents. The memoirs only specified from where the water comes *in* and drains *out* without any specific measurement of channels and their dimensions. This again leads to another complex issue of how to arrive at what are the correct and original dimensions for a supply channel even when

[6] TRS memoirs for several basins including Vaigai, Gundar, and Vaippar were referred for this research. Though there are some variations in the style of writing between those published in British times and after, they all attempt to follow the same set of procedure to describe every component of a tank.

memoirs are available for tanks. In case, if the dimensions go beyond the existing government owned land space, the private holder may not allow the retrieval of the channel and its re-development. In several cases the entire or parts of channel run in private lands and the land holders object to the tank users to enter into the land and clean it regularly. Some of the court cases reported in the later chapters provide details on this issue. Several observations are made about this phenomena in the extensively studied participatory tank rehabilitation projects undertaken by the Anna University (CWR 1992; CWR and Ford Foundation 2001; Sakthivadivel and Shanmugham 1988).

Today, even when projects really intend to develop tank channels, there are many difficulties in arriving at the correct specifications and a re-design for the supply channel. Several compromises have been made on the ground to respect the legal position of the owner of the adjoining land who always objects that such a project that is detrimental to his/her property. A case study of re-developing a supply channel named *Pirandodi* taking off from Thirumanimuthar river in Madurai shows many difficulties in redesigning them. The channel was 6 m in width for a length of 1.75 km as per Tank memoirs published in 1913. However, in 1997, in land revenue records, it decreased to less than 2.5 m at its origin and 1 m at the end. Several adjoining land holders have got the tank channels between 1913 and 1997. Redesigning the channel to convey the required flow to the downstream tanks has to be done with great difficulties and compromises with the private land holders on the channel (Shanmugham and Kanagavalli 2000). Fearing these 'unwanted' complications in the tank development work the government departments and their contractors hardly do any redevelopment of channels. It is rare to find any government sponsored tank development work to include supply channels in their estimate for rehabilitation works.

4.3.2 The status of memoirs

After, nearly a century since its inception, in the 1980s, the last of the two functioning TRS units in Tamil Nadu (Villupuram and Sivagangai) was wound up.

Over time, within the increasingly cash rich Public Works Department (PWD), these engineering circles have received small funds for their work and closed once for all. The basic research work in counting and surveying the tanks involved very small budgets and acquired a sort of undesirability within the PWD that deals with millions in development works. When they were wound up, these engineering circles were preparing the second or third round of tank assessments and never got the volumes completed and published[7].

With the closure of these units in the PWD of Tamil Nadu, no up-to-date information or a database is presently available. Thus the job remains half done. Availing those printed memoirs is again very difficult and may take years of correspondence with the department that still hold some of them[8]. The manuscripts remain rotting in the departmental record rooms and need to be discovered in bits and pieces[9]. On the whole, the understanding of tanks and its

[7] I visited the office of the Assistant Executive Engineer of PWD office at Virudhunagar in July 2010 for this research and found them having typed manuscripts of some parts of the memoirs. The officer regretted their department is yet to print and supply these basic documents many years after the TRS memoir circles were closed down.

[8] For DHAN Foundation, an Indian nongovernment organisation involved in tank development works it took nearly three years of correspondence and personal meetings to get hold of a few sections of printed memoirs for Gundar basin. Initially not many staff knew where it is kept; when it was accidentally found in a heap in a old record room none knew whether it should be given to researchers; when decided by the local office to give for ‘government sponsored research’ the department could not fix a price since it was not priced; and finally the top government secretary intervened to provide this to outside agencies. I have involved and understood the status of keeping such scientific records within the government.

[9] The status of these engineering circles was similar or even worse in other tank intensive states such as Andhra Pradesh, Karnataka and parts of Kerala. None of these states have any of these technical memoirs published and it remains a distant memory for some old and retired engineering staff. I worked in tank intensive districts of Tamil Nadu, Andhra Pradesh and Karnataka, and noticed many young engineers did not even know such a thing ever existed. This is based on my personal experiences of tank rehabilitation projects during 1997-2005.

technology is never fully analyzed and realized to date. A basin level analysis of tanks and tank chains through all pre-existing memoirs may throw insights on how these tanks and habitations came into existence in such a large scale in states like Tamil Nadu.

In general, data related to tanks remain incomplete since the days of the British. Even how many tanks exist in the state itself remains a confusing figure, reflecting the attention shown to them. The number of tanks reported over the last six decades after the independence was always lower than what was existing on the ground at any given point in time. As per the Season and Crop Reports there were 22,984 in 1950-51; 34467 in 1961-62; 37,414 in 1971-72; 39,003 in 1996-97; 41,260 in 2006-07 (Sivasubramanian & Gandhiraj, 2009). It is still debated how the data collection about tanks can be done and consolidated in order to present the correct and actual status of tanks in the state. The Land Revenue Department of the Tamil Nadu state government is said to be currently (2011-12) undertaking a 'rationalization exercise' to arrive at the correct number of tanks in the state (*Revenue Department Policy Note* 2012). An economist and a former member of the Indian planning commission summarized that the "available official statistics of tanks are inadequate, inconsistent and confusing. There is not even an authenticated count of the number of tanks and the actual extent of area irrigated by them. Practically nothing is known about the quantum of water supply, its seasonal distribution and reliability, the extent to which they have changed and the factors, which have contributed to it" (Vaidyanathan 2001, 155).

4.3.3 National hydrology projects

In the nineteen eighties, there was clamour for data for water resources planning, and as a result the World Bank funded the National Hydrology Project (NHP) in India. This project covered seven states including the tank-intensive states of Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra. The phase I of NHP

(1995-2003)[10] spent 142 million USD and claimed a real-time Hydrologic Information system (HIS) covering all surface water systems was established. The project continues in a second phase[11] (2004-2014) with 135 million USD and the government departments were expected to develop and sustain 'hydrological designs and decision tools for improved integrated water resources planning and management'. A respected teacher among the hydrologists Professor Ven Te Chow, explains the importance of hydrology:

> Hydrology is a science that underlies the development and control of water resources, it has its important influence in agriculture, forestry, geography, watershed management, political science (water law and policy), economics (hydro-economics), and sociology; and it has practical applications in structural design, water supply, waste water disposal and treatment, irrigation, drainage, hydropower, flood control, navigation, erosion and sediment control, salinity control, pollution abatement, recreational use of water, fish and wildlife preservation, insect control, and coastal works (1964, pp. 1-5).

Researchers would expect that NHP might be able to offer some such details about tanks as well. Unfortunately, that was not the case. The NHP did not even recognise tanks as part of the 'hydrologic systems'. Tanks, which were ubiquitous and omnipresent did not come to the notice of the NHP. The result is that they did not offer even the list of the names of all tanks. Strangely, in the same period, the Madras High Court dealt with public interest litigations surrounding encroachments on tanks and ordered the government must identify all tanks and let their details be known to the public[12]. Data related to tanks was never collated, published and made available to the public under this project. The

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[10] World Bank, 2010. Documents & Reports. "India - Hydrology Project." Available at http://documents.worldbank.org/curated/en/2004/05/4261267/india-hydrology-project [Accessed 23 June 2012].

[11] World Bank, 2010. "Implementation and Completion Report." Available at http://web.worldbank.org/external/projects/main?Projectid=P084632&theSitePK=40941&piPK=64290415&pagePK=64283627&menuPK=64282134&Type=Overview [Accessed 23 June 2012].

[12] *L. Krishnan v State Of Tamil Nadu [2005] 4 CTC 1*

importance of understanding tank hydrology and plans for hydrologic data gathering in India is poorly recognised.

In conclusion, mastering the understanding of tanks remains a half finished task. It started late after damages were done by the land settlements, and remained incomplete forever. In the meantime, the use of simplifications, approximations and generalizations were extensively and continuously adopted. The discussions in chapter 7 would show such approximations are not helping in estimating water availability in tank intensive basins like Vaigai. The conflicts within a tank or a tank cascade or at a basin that could have been well understood by these surveys and projects were never realized until today.

4.4 DIVIDING SMALL AND BIG: POLICY IMPLICATIONS

Defining what is a tank, and how it is formed as an individual tank and as a network is very difficult because no specific literature exists to describe them. There are no simple and straight answers to explain this technological phenomenon in the differing geographies where they are found. Many expert engineers and teachers generalize tanks as 'storages' meant to supply water when it is needed. B.O.Reynolds[13] in his Irrigation manual to train engineers in Madras said,

> They [storages] may be broadly classed as reservoirs and tanks; the former term being applied to works where large volumes of water are impounded by earthen or masonry dams constructed across the natural drainage lines flowing in a valley ; and the latter to smaller and shallower works formed in natural depressions of the ground or by low earthen bunds placed between ridges (Reynolds 1906, 136).

[13] Reynolds's manual of (1906) on Engineering works is the first effort to have a comprehensive handbook on various engineering works for teaching students and engineers of the Madras PWD. Prior to this manual there existed compilations of notes on tank repairs etc., (Samuel BEST Captain 1852), but they were not so detailed to guide the entire department.

But then, in the same manual he provided no definition of what is big and small in tank bund or depth of water stored. He said,

> ..thus the embankment of the Cumbum tank in the Guntur district [in Andhra Pradesh] which is over 100 feet high, is little more than 300 feet long, but the water surface of the reservoir is about 8 square miles: while another example, the Chembarambakkam tank, about 14 miles from Madras, has an embankment 3 miles long which sustains a minimum depth of only 20 feet or so; it has a waterspread of 8.95 square miles and a capacity of 103 millions of cubic yards. In Mysore the Miggar tank has an earthen embankment 84 feet high and 1,000 feet long (Reynolds 1906, 5).

Going by his own examples in his technical manual, tanks are as big as any modern reservoirs that were usually built across the river in the twentieth century, involving massive concrete dams and weirs. It is very difficult to arrive at any generalization with respect to 'small and big' with any amount of certainty in tanks. It is agreed that tanks are very similar to any modern reservoirs that we see today in its conception and formation. However, forming tanks in the whole basin covering several thousand square kilometres warrants something more. Understanding of the local geography alone is not enough but also the wider area in which they are situated. As Reynolds noted "In the Madras Presidency they [isolated tanks] are a comparatively small and unimportant class. On the other hand, groups of tanks [chain of tanks] are very numerous, and the number of tanks in a group is often large (Reynolds 1906, 140)". Also, Ellis in his irrigation manual suggested the chain of tanks in south India have better performance when compared to the small number of isolated tanks in the presidency (Ellis 1963). In general, tanks in Deccan Plateau of south India are 'chain tanks' where the series of tanks are formed within the same valley utilizing the runoff as well as the drainage from paddy fields (Sinha 1957, 36–37). Therefore, planning for development of tanks in the ancient days had gone beyond a single tank, or even a chain of tank, to the entire basin or even beyond the basin. Therefore it appears that, there is nothing local or simple about the technology rather it is highly complex and yet to be understood in full.

In general very little knowledge available to know how such a technology came into existence from colonial and pre-colonial evidences. In the last two hundred years, only a few hundred tanks are newly built and there are no project reports available to indicate developing a complete chain of tanks or tanks in a sub-basin level. Also, from the pre-colonial evidences available in the form of inscriptions, very little is known on what basis the tanks are designed and formed. A manual published by Community Development Department of the Government of India to some extent captures the varying types of tanks found all over India. It covers from the arid regions of Rajasthan and Kutch to semi-arid regions of southern peninsular India and summarises some of the advantages and disadvantages of chain tanks, and anicuts fed tanks found in south India (Sinha 1957). The manual is at best a rudimentary exercise in offering a broad engineering perspective of all types of tanks that are found in India. A complete synthesis of various aspects of tank engineering is yet to be done.

The available historical evidences are either incomplete or misleading. For example, one 14th century inscription provided 12 points of merit noticed in a particular tank and six possible faults that may occur in any tank. The points of merit were: (i) a righteous, wealthy and happy king desirous of permanent fame; (ii) a learned hydrologist; (iii) hard clay ground; (iv) a nearby river to provide fresh water; (v) hill on the edges (vi) a dam between the hill; (vii) two high grounds (viii) extensive and deep bed; (ix) a nearby quarry to provide straight and long stones; (x) foreshore lands preferably with orchards; (xi) the sluices to withstand strong eddies; and (xii) skilled men in the art of tank construction. The six faults are: (i) water seeping out of the dam or bund; (ii) saline soil; (iii) located at the boundary of two kingdoms; (iv) elevation in the middle of the bed; (v) scant supply of water and extensive stretch of land; and (vi) scant ground and excess of water (Srinivasan 1970, 320).

The points of merit could be applicable to a big and massive tank such as the Porunamilla tank referred above. However this is not the case everywhere including the Royalaseema region where this tank belongs to. Similarly large tankfed areas like Ramanathapuram district does not have at least six of the points of merit listed in this list but yet it has more than 2000 tanks (one tank in every 2 sq.km or less). Hundreds of tanks in Ramanathapuram do not have a nearby river; the bunds are not connecting the hills. In fact there are no hills in the district. The area is an absolute plain with average slope of 1 % or less, and has very limited high grounds. There is no extensive and deep bed, no nearby quarry to provide stones, and no foreshore lands with orchards. But still the technology combining small and big tanks is working on a large scale in Ramanathapuram.

A study of Sri Lankan tank systems about their origin has observed all types of tanks - big and small - could have come together *at the same time*. Panabokke et.al, studying Sri Lankan tank cascades that are very similar to south Indian tank systems, reported “from all accounts it is clear that the spread of these small tank irrigation systems would have taken place concurrent to the construction of the major irrigation systems [large Tanks]” (Panabokke, *et. al* 2002). Since all tanks are a reality, and interlinked within a chain using same channels it is reasonable to believe such a proposition that every size of tank has its technical basis (in a chain of tank) and social importance (in a given area).

However, in the nineteenth century the classifications made to develop and maintain them were solely based on size of the revenue generated. In the initial days of the engineering department (the PWD) in 1852, the tanks were divided into two categories as ‘big and small’. The PWD was given the responsibility of repairing the big tanks irrigating over 200 acres and the rest was looked after by the non-technical Revenue Department. That was the first major division of tanks into small and big. Within the PWD, these tanks were again classified into major, minor and agricultural works depending on the schemes with which they were combined. The vast majority of the small tanks, covering below 200 acres, were treated as ‘agricultural works’ and received only petty works of repair to *anicuts* and tanks. The only good thing happened to small tanks is that the TRS parties investigating tanks for their engineering features made considerable progress in recording their technical details (PWD 1891). The justification for the categorization as big and small in the initial years of the PWD was that, as an organization it was new, small and could only tackle a small number of systems (Krishnaswamy 1947, 439).

However, over the last 160 years since this artificial division the engineering capacities in the state have increased tremendously, yet the same treatment continues in policy. Today, tanks covering the size of 100 acres are maintained by the PWD and those less than 100 are maintained by the Panchayats (elected local bodies). This continuing segregation is an indicator of an incomplete appreciation of the inter-linkages among small and big systems lying in the same geography. The fallout of this division of small and big tanks left to ignore the channels linking them. When improvements are aimed solely on the big tanks, the interlinking channels and the small tanks lying in between them are ignored. Since hydrology does not separate small and big tanks and their channels, every tank suffered in the end. Any tank development works undertaken ignoring the channels remained partial and a half measure. These hydrologic implications[14] are rarely considered while planning for the projects, because of the policy that separated the big and small tanks and their administration and development. Developing tanks on an individual basis is continued to date with some rare exceptions. A discussion about this aspect is taken up in the following section showing how such development projects ultimately resulted in suboptimal benefits.

4.4.1 Revenue maximization and Paddy cultivation

There are numerous tanks built to supplement the monsoon rains. Hence, many were knowingly built small in size and not expected to fill every year. Strange (1904), from a hydrologic perspective, described the need and necessity for these

[14] Seenivasan, et.al (1999) discuss a specific case on this to show ignoring small tanks and channels will not result in better performance, rather every tank and channel should be considered at the same time for development.

types of smaller tanks that are otherwise called 'undependable' in land revenue collections. He wrote:

> The real benefit of tanks constructed in such areas is that, when the rainfall is deficient on the whole, or is so irregularly distributed as not to be capable of bringing crops to maturity, their storages, will be able to supplement it and to permit of the growth of the crops. There are many more years of deficient and irregular rainfall than there are ones of total scarcity, and it is during these former years that tanks will be of substantial benefit and will fully justify their construction (1904, 45).

It is exactly, 'this many more years of deficient and irregular rainfall' than the years of total scarcity that led to the creation of such smaller tanks in many parts of Tamil Nadu in the first place. In districts suffering from high rainfall variations[15] and frequent droughts, these small tanks act as a supplementary source rather than a main source of irrigation. They offer protective irrigation by one or two wetting, water for cattle, recharging wells and drinking water. This is not well understood in policy, and all small tanks were misunderstood as *'undependable'* systems.

Because of its undependable nature, revenue could not be collected year on year and government policy negated *maintaining* them. Even when the Indian Irrigation Commission wanted to develop all tanks in the Madras Presidency it suggested the bigger tanks alone be maintained by the government and the smaller ones given away to the farmers with some conditions attached. On an experimental basis, when the farmers agreed to do the maintenance, the government reneged about the remission of land taxes proportionate to their maintenance. The commission narrates this experience from Madurai district in its report and wanted a policy to repair all tanks at once. (India. Irrigation

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[15] In Vaigai basin (in parts of Ramanathapuram) the rainfall variation is *up to* 40 % from the normal. This phenomena is discussed in the case study of Vaigai basin tanks in chapter 7

Commission. and Scott-Moncrieff 1903, 110–112). However, this never happened till date.

Paddy as irrigated crop

Another complexity that is not well understood in policy is about the paddy cultivation under tanks. In many areas of Tamil Nadu, paddy cultivation is done with limited water. For example, Ramanathapuram district is considered a chronically drought hit but yet intensely paddy cultivated area. The tanks optimize early drought and late water logging due to rainfall fluctuations within a single crop season[16]. The *ayacut* areas of all tanks are defined and limited for tax purposes; however in reality they either extend or shrink depending on the situation. If the start of rainfall is good even dry areas are sown with paddy; when the amount of water in the tank is more than for the delimited *ayacut* the dried sowing get converted to wet. The crop yields multiply up to 3 times or more when it gets converted from dry to irrigated conditions.

Many of these type of tanks that are supplementary and complementary to dry cultivated areas were called 'undependable' by simply looking at whether it gets filled every year and serves the same *ayacut* area without fail or not. Various reports including that of the Irrigation Commission describes these smaller tanks as 'precarious', 'poorly performing', and 'inherently undependable'. Combined with a policy of segregation into small and big and low investment, these small systems went into further and continued neglect. For example, the Irrigation Commission (1903) recommended the small tanks should even be converted into ordinary agricultural fields and collect the normal rates of land tax, whenever they cease to be a tank. The urge to generate unfailing land tax year after year

[16] Source: "Tamil Nadu Agricultural University: Paddy Research Station, Ramanathapuram" Paddy constitutes two third of the total cropped area of the district, of which half of it is done in semi-dry conditions http://www.tnau.ac.in/rmd/rmdd_files/frame.htm [Accessed 12 September 2012].

drove the policy rather than understanding the finesse of the technology and agriculture behind it. The contempt for small tanks as 'undependable' continued even after independence and was not understood fully through any adequate research[17].

4.5 TANK DEVELOPMENT: MOVING TOWARDS BIG AND BIGGER

The following discussion is to demonstrate how the two centuries of tank development is driven by a policy of preferring big tank. After the land settlements, responsibility of administering the tanks was done by the government in *ryotwaris* and by the *zamindars* in the *zamindaris*. In the *ryotwaris*, the smaller tanks were initially maintained by the land Revenue Department, which was later turned over to the Panchayats (between 1952-1970). Neither the Revenue Department nor the Panchayats had any dedicated engineering staff[18] to undertake tank development work on their own. Only after 1952, did the Panchayats have some engineering staff loaned from other departments to do tank works along with several other rural development and construction works. The better equipped Public Works Department (PWD) was involved only in the maintenance of less than one quarter of the total number of tanks. This is the state of affairs of the government departments related to tank development.

[17] There is only one small research station established in 1991, to do research on dry paddy in the state of Tamil Nadu. The station in Ramanathapuram is tiny, always understaffed (have only two researchers) and did not involve any big research. On the contrary, there are several research stations with hundreds of researchers working on irrigated rice. Refer to a presentation available at < http://www.tnau.ac.in/rmd/rmdd_files/frame.htm>

[18] Revenue Department and Village Panchayats did not have any technical officers to undertake any tank development works at any time. The block level Panchayats (called Panchayat Union) usually have an engineer and a overseer covering an average of 30 Panchayats (around 100 villages/hamlets). The responsibility of the engineering team is to cover an average of 70 small tanks and 350 ponds that are found per Panchayat Union. The engineers have several other works to attend, of which tanks are the least priority.

4.5.1 Repairs, Rehabilitation and Restoration (1800-1947)

The initial focus in the 1800s was to close the breaches in tank bunds and to repair sluices, weirs and other structures. All those different projects named as Tank Repairs, Rehabilitation and Restoration was intended to bring back the large dysfunctional tanks to some level of functioning. Policymakers like Edmund Burke, while glorifying the tanks as the 'national bank of the country' (Cotton 1900, 61), had to regret that the East India Company did not understand the value of tanks. He sought for specific (re)development projects in uncertain terms. In the Madras Presidency soon after the land settlements began, the company commenced such works in a small way. It opted for a good and high returns policy in the form of higher revenue realization from tank works to the government. As we know today, most irrigation and tank rehabilitation works of the company offered handsome[19] returns and were highly profitable.

PWD as a separate department came into existence in 1852 and started doing tank works and a broad range of valued irrigation works were identified by the Public Works Committee through its collective memorandum of 1854. The committee explicitly suggested the "main principle followed is the diversion of larger streams whose periodical freshes rarely fail" (*Collective Memorandum on Public Works in the Madras Presidency.* 1854, para 74 p26). The departmental discussions moved towards undertaking highly profitable and bigger projects to remodel the existing *anicuts,* expanding big tanks (like in the Sangam project) and linking rivers and channels with big tanks. All prominent *anicuts* in Tamil Nadu on the important rivers like Cauvery, Vaigai, Palar and Tamiravaruni benefitting tanks were listed in the Committee's report and accomplished well before 1900. It

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[19] For example, Saradha Raju (1941) reported:"The total initial cost of new irrigation undertakings between the decade 1835-1845 was less than Rs 0.55 millions, which yielded aggregate increased revenue of nearly Rs 5.3 million and an annual profit of 70 %."(1941, 132).

engaged separate circles for tank rehabilitation alone by the year 1883 (Raghavaiyangar 1898; Baliga 1960).

A review of important projects in Madurai district for the period of 1840-1855 also reveal that most of the tank projects were aimed at only big sized tanks and *anicuts.* The government acknowledged the financial importance of tank works undertaken during 1840-1855 in Madurai district in a debate between the PWD and the revenue officers. An increase of returns in the order of over 26 % noticed every five years in these projects[20]. Also, even the major reservoir projects like the Periyar project in Vaigai basin cost Rs 7.7 million in 1882. It did include supplying additional water to hundreds of existing tanks in Madurai district (Mackenzie 1899). This is distinctly a financial figure hundreds of times higher than the amounts normally spent on irrigation especially on tank projects. This project particularly used the existing river infrastructure and tank networks with new technical components such as head-works (sluices and weirs). However, all types of tanks were having problems and the smaller ones were even more in trouble and required development in an urgent manner (Krishnaswamy 1947). When compared to the bigger tanks, there were not many projects to develop smaller tanks and their supply channels. The decision purely was on financial considerations without any technological basis.

4.5.2 Rehabilitation to Standardization (1947 – 1978)

Tank restoration projects gained some importance and moved towards a standardization process after 1947. The aim at that time was to create uniform specifications for all tanks as specified in the tank memoirs in a larger scale and pace. The assumption is every component of the tank has a designed standard and has to be ensured. For example, dimensions for bunds (top width, side slopes, full tank levels and maximum water levels etc.,) were made uniform for different

[20] T.S.A Records PWD year 1855-56. Letter No 107, Civil engineers office, Eighth Division, Madura dated 16th October 1855. Letter from Captain. Horsley, to Lt.Col.C.E. Faber, Chief Engineer, Madras Presidency.

sizes of tanks. These specifications are based on the TRS engineering memoirs that mentioned the desirable dimensions for components of tanks. In the early 1950s, tanks in the state of Tamil Nadu contributed over 40 % of irrigation. PWD's irrigation wing continued to undertake works in big tanks. But various Departments including Agriculture, Rural development, Local Administration and Labor launched projects in smaller sized tanks, starting to grow more food, offer food for work, and improve minor irrigation (Baliga 1960). Tanks taken over from the *zamindaris* were treated as special case and almost all of them have got some benefits by way of improvement works through special projects under *Ex-zamin* tank programmes (Venkataramani 1974).

Apart from developing tank structures, many other interventions in forestry and fishery were introduced during this period. The Forest Department and the Panchayats undertook plantations of Acacia trees in tank beds with large water spread areas. The Fishery Department took over certain tanks for promoting fishery cultivation. These activities were done to increase the availability of fodder, fuel wood, timber and fish from tanks[21]. These projects once again, tended to focus on the individual tanks without undertaking any works on the much needed supply channels. The channels were still expected to be the responsibility of the farmers through their voluntary labour or *kudimaramat*. Every five years a tank was expected to get its turn of repair works. However, many tanks did not attract any big scheme to rehabilitate them. Even when small repairs were taken up under the cycle system, the most critical supply channels were rarely considered. Since the job is difficult, involving encroachments officers and contractors do not take such a risk. Long years of neglect made the adjoining land owners of channels and tank foreshores extend their encroachments. During the period of 1950-75, the government legitimized many such encroachments and delimited them from the government property and turned it over to the cultivators (Palanisami and Easter 1983). This was again done without considering

[21] A series of orders issued under the Madras Panchayats Act (1952) during 1962-1977 are available in Palanithurai *et.al* (2007, First:255–57)

any technical consequences[22] on the inflows and outflows.

4.5.3 MODERNIZATION (AFTER 1978): MOVING TOWARDS CEMENT

I use the term ‘modern’ as it is discussed in the policy, projects and related debates in “Tank modernization”. They referred to projects done in the late sixties. For example, establishing river control measures such as head regulators, other head works and separate channels was considered ‘modernisation’ of the ancient lower Vaigai system (Mohanakrishnan 2012, 170–79). Similarly, the first conference tried to establish Tank modernisation in Tamil Nadu in 1982 did not go beyond repeating – construction of new sluices and lining of field channels as Tank modernization (Sakthivadivel *et.al* 1982, 1–21). The conference proceedings (based on which most of India’s tank modernisation programmes followed) tried to establish tank modernisation means reconstructing the existing sluices, weirs and lining of channels with some measure of bringing people participation (Anna University 1982).

The modernization of tanks was based on the assumption that the efficiency of the existing tank systems in terms of holding more water could be increased, using water better in the *ayacut* (Sakthivadivel et al. 1982). Many old sluices were demolished and newly built even when they were working fine. Sluices were fitted with screw gear shutters in the place of the traditional plug and rods. Channels were lined as against the earthen courses. Crest of the weirs were changed into Ogee curved topping. The modernization in many ways led to the

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[22] For example, while giving away the land to private encroacher, a channel of 10 m width might get reduced to 2 m; a foreshore might get reduced to half or one third of its original size. Such a change will grossly alter the inflow and outflow, and storage of the tank. No engineering opinion was necessary to do such a regularisation exercise. The reason cited in most cases was that ‘they were held for a long time’ by the encroacher, and turning it over to the encroacher do not affect the tank performance. Such a certification will be given by the local revenue officials like the Village Administrative Officer. Based on interviews with Mr.Muthukrishnan, a retired Village Administration Officer worked in Madurai district. Date of interview 23 October 2011.

overuse of cement, concrete and mechanical devices[23]. The much needed earthwork of de-silting the channels and beds was not done as in the previous periods. In fact, the PWD had limited the earthwork just to strengthen the bunds, fearing frauds in earthwork.

Deviating from the previous projects, European Economic Community (EEC)-funded Tamil Nadu Tank Modernisation Programme was significant in that, for the first time, an extensive system of monitoring and evaluating the impact of the project was set up. The project arrived at unit costs for each item of work for the first time and considered a sufficient amount. Again for the first time, the selection of tanks for development was claimed to be done using a combination of hydrologic and social parameters (CWR 1992). The project criteria to choose tanks included the following: selected tanks must have an *ayacut* of 100-200 ha, the *ayacut* should be 90-95 % cultivated in the previous years, and should be easily accessible to the officers. The approximate cost per hectare was fixed at Rs. 21,000 in 1994, which was several times higher than what was usually spent for small Panchayat tanks. The project was expected to save about 20 % of water (CWR and Ford Foundation 2001). Thus these criteria limited the ambition of the project to work only with big tanks that are already in some good form and no consideration given to the interlinked channels and small tanks.

This programme funded 649 big tanks in all. Above all though it used hydrologic criteria it did not see the tanks as interconnected networks that need to be seen as a cascade. The lined channels were often done in poor quality without consulting the farmers and were mostly dismantled by the farmers in most of the tanks. It is rare to find any tank where this modernization of channels is intact from head to tail end of the field channels[24].

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[23] Observed from tank project estimates of several tanks done in Madurai district during the period (1994-2000).

[24] Direct observations made during the field work in Madurai and Ramanathapuram districts. The breakings of lined channels were also reported in

A recent evaluation (in 2008) done by economists after 8-15 years of completion of individual tank projects under the EEC funded project, concluded there is no significant improvement as was claimed. The report said,

> Even though, in EEC tanks, the water availability has increased from 10 to 20 days per season, the difference was not significant between EEC [modernized tanks] and Non-EEC tanks [non modernized tanks]. Further, most of the other parameters such as tank filling pattern, crop yield and farm income, presence of WUA though looking favorable to EEC tanks, could not confirm that EEC modernized tanks had performed better than Non-EEC tanks (Palanisami et al. 2008, 42).

World Bank funded projects on tanks followed the EEC project models in their content and aimed to improve the efficiency of water use. In this regard, modernization of Periyar Vaigai Irrigation system[25] was one of the first and major project also funded tank modernization, apart from river improvement and lining of canals with cement. The project was again cement construction oriented involving bigger funds and costlier compared to any known previous works. Water Resources Consolidation project[26] (WRCP) followed the Periyar Vaigai Tank modernization project model. The project again benefitted the big tanks and did not include the small tanks (CWR 2003).

Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management Project (IAMWARM) are another ongoing[27] initiative related to

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the Monitoring and Evaluation Reports of CWR. There are no detailed studies exist to know the extent of damages across the state. The same is observed in Villur chain of tanks in Madurai district that was studied for this research.

[25] A detailed discussion on the project and its effects on tanks follow in the next chapter discussing conflicts in Vaigai.

[26] During 1995-2004, WRCP undertook 620 non system and rain fed tanks and unknown number of system tanks with a loan of US$ 282.9 Million.

[27] World Bank offered a loan of 566 Million USD for the project; of this total, tank modernisation amounted to 282.83 Millions USD, and tankfed agriculture development amounted to 117.18 Millions USD.

tanks. The project claims to increase irrigated agriculture productivity in a 'sustainable water resources management framework, to be done at a sub-basin level'[28]. This project though is different from the previous ones to an extent that it defines a sub basin as a unit and is aimed at all types of tanks irrespective of the size[29]. The results are yet to be known for its performance.

Overall the policies related to modernization projects demonstrate the extent of misunderstanding in the technological interventions. They were planned as high cost capital intensive works aiming mostly on big tanks with the excessive use of cement. These projects on the whole did not attempt to bring any material changes in the policy related to identifying and improving the interconnected tanks and the channels. Though some of these projects like the EEC and WRCP claimed to bring Institutional changes there was no legal backup provided to them. There were no systematic efforts to redeem the tanks from encroachments and offer the communities some control over the tank usufructs and use it for tank maintenance and rehabilitation works.

4.6 OTHER POLICY ISSUES

Historically there are two methods to solve the problem of siltation in tanks: one by large scale desilting; second by raising the Full Tank Level (FTL) of the tank. Since the days of the British both practices have been stopped[30]. The desilting is

[28] The project included tanks modernisation on a sub basin level but it is not very clear that whether the works included all the supply channels or not.

[29] Documents related to this project available at www.iamwarm.gov.in. Checklist available at: http://www.iamwarm.gov.in/FAC/CHECKLIST%20FOR%20WRO%20PROPOSALS%20IN%20THE%20DPR.pdf [Accessed 20 December 2013].

[30] The contractors record a higher volume of silt removal (rather than the actual) in collusion with the engineers and supervisors. Since it is difficult to keep a check on this work by the department it stands a proscribed activity. PWD code and the prevailing Rules of the Panchayats Act prevent desilting below the sill levels of the sluices. Requirements of excavations beyond stabilising the bund is usually not approved by the government.

not done because it is easier to cheat. Raising the FTL is not done because it might involve the acquiring of lands adjoining the foreshore. Since the foreshore lands had been given away to farmers under the land settlements it is not possible to acquire the lands as easily. This policy has prevailed for the last one century or more. Technically the easier option of solving the problem by raising the FTL is foreclosed because of the legal situation that defines the rights of the foreshore owners. If at all such a decision is made then the new acquisitions proceedings have to be commenced to get the foreshore lands.

Alternative approaches developed by Anna University focused on bringing 'farmers participation' in rehabilitating the tanks and avoid the use of contractors. The PWD was powerful enough to prevent any such ideas and the projects beyond an experimental level. Even the experimental projects of the Anna University and the DHAN Foundation faced severe bureaucratic problems enough to demotivate and threaten the participating farmers' organizations not to venture into this domain of the PWD. These approaches however demonstrated new ways to bring the alienated farming communities to involve themselves in tank development (Sakthivadivel and Shanmugham 1988; CWR 1992; CWR and Ford Foundation 2001). Similarly, a reluctantly funded pilot project by the PWD to DHAN Foundation to develop all tanks in a cascade (for the first time in Tamil Nadu) including the channel networks demonstrated the need to understand hydraulic and hydrologic linkages between tanks. The project was a shift in the way the tanks were looked at technically. It went on to develop all tanks – small and big, all channels and other structures at a time and showed the benefits of such projects (Seenivasan et.al 1999; Karuppusamy and Seenivasan 2001). However, not all lessons of the pilot project was taken into account in the projects that followed later.

Summing up, in the last two hundred years, the mainstream tank development projects in common, show the following trends: financially moving away from small to big returns involving big funding; technically missing the inter-linkages between tanks; placing emphasis on construction and inappropriate technological components neglecting the much needed earthwork and socially alienating the local communities in undertaking rehabilitation works. The naming varied without any substantive difference in the content: from repairs to restoration; rehabilitation to standardization and modernization.

4.7 CONCLUSION

The land revenue policy as implemented by the British for a long time ignored the technological integrity of tank systems. This resulted in allowing and perpetuating the abuse of tank systems especially the tank beds and channels. The efforts such as the Tank Restoration Survey (TRS) Memoirs in properly surveying and documenting the technological features of all tanks, channels and *anicuts* remained incomplete making our understanding of tanks incomplete. As the tank development projects become bigger and bigger in size its coverage in general ignored smaller tanks and left them to natural decay. Emphasis on inappropriate technical components such as expensive cement constructions for the lining of channels, replacing pre-existing sluices instead of repairing them, did not bring any substantial change in performance and reduce the conflicts. During these projects, the inter-linking channels were not attended to by re-excavating to their original sizes and kept alive the conflicts between the encroachers and tank users. Thus many water conflicts of the present have to be traced to the land settlement policies, the tank development policies and the technological understanding about the tanks. The next chapter will highlight the role of land settlement laws that paved way for the government to control the water.

5. BUREAUCRATIC RULE OF WATER

The limited approach of studying only the statutes and case laws in the existing literature has given a false understanding that the water law is statutes based and emanated from the legislatures - say Parliament or other legislative assemblies of elected representatives. This chapter explains the administrative orders in the form of BSO created by the colonial bureaucracy forms most of the water law related to tanks. A historic approach is followed here to understand the evolution of this law. These orders issued since the early nineteenth century to the present shows the attempts of the bureaucratic reordering of society into creating *ryotwaris*, *zamindari* and other settlements dividing the geography and affecting the interconnected tanks. Studies in Indian water law have so far ignored this body of law and this chapter fills this gap. The key proposition in this chapter is that the colonial law is not a simple 'legacy' but a living law in India and that is one of the reason that the office of the District Collector established by the East India Company (EIC) remains such a crucial part of the administrative machinery that still hold the key in administering the rivers, tanks, its water and usufructs etc.,

Section 5.1 details the origin of the Revenue Board and the Standing Orders. Section 5.2 focuses on the details of the *ryotwari*[1] system which is presently followed in Tamil Nadu. Section 5.3 details the creation of 'government' and 'private water' paradigms in law. Section 5.4 details the continuing bureaucratic rule of water even when the so called statutes mandating local governance in general and tanks in specific are in force. Section 5.5 brings light on why collective action fails and its relationship with the revenue laws. In each of the sections the common thread traces the underlying conflicts between the government and the *ryot,* wherein the government's intention is to realize more and more revenues

[1] The person whom the government enters into direct engagement under *ryotwari* system is called the ryot. The word ryot is a corruption of Arabic word, *rayut*, which literally signifies pasture or herd of cattle, and was introduced into India after Mahommedan conquest (Iyengar 1933, 96).

and exercising control over tanks and the *ryots* interest lie in better use of tanks. This chapter ultimately shows the role of law made since the days of colonial rule is a source of conflicts in tanks.

The chapter builds on the previous discussions about the simplistic understanding of the tanks as technology systems and will complement the discussions about the case laws and the case studies in the following chapters.

5.1 THE BOARD STANDING ORDERS (BSO)

The first major accomplishment of colonial rule after the political takeover in Madras presidency was to organize the land settlement processes, and prepare and issue land documentation to landholders under three different systems of land settlements- *zamindari, ryotwari and inamdari*. While the *zamindari* and *inamdari* had separate legal enactments the *ryotwari* did not have any specific legal enactment *per se.* It was done by the Board of Revenue through a series of executive orders, called the Revenue Board Standing Orders or BSO.

While the formal founding of Madras Presidency happened in 1659 the Revenue Department came into existence in 1774, and dealt with matters related to land (and water) administration[2]. The Board of Revenue was established (along with four other such Boards on trade, military, medical and marine) in 1786 as part of the Revenue Department. Since then, the Board of Revenue became one of the important law making body related to land and water until it was wound up in 1980[3]. Thus the Board survived from the then EIC administration (1786-1857) into British India (1857-1947) and later to the Indian Republic (1947-1980). It continued to function on the same lines from the days of the EIC until 1980, and

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[2] Source: "History of Revenue Department", Government of Tamil Nadu available at http://www.tn.gov.in/documents/histn.htm [Accessed 12 March 2012].

[3] *Tamil Nadu Board of Revenue Abolition Act 1980* abolished the Board and the powers of Making such orders were taken away from it. The nomenclature of the BSO is changed into Revenue standing Orders (RSO). For the discussions here, I prefer to use the acronym BSO.

remained an exceptional law making body that survived for such a long time in the modern history of India.

Nineteenth century scholars like Baden Powell had to concede that, in the absence of any legal enactment, the BSO issued by the Board of Revenue was the Revenue Code for the *ryotwari* areas. He wrote, "Really, the Standing Orders of the Board are the Land Revenue Code of this province; and no one can thoroughly master the revenue administration without studying these in detail (1892, Vol III.106)". Since the colonial times, the land administration always included the water administration in general, and tank administration specifically. The first standard compilation of BSO occurred in 1851 (Board of Revenue, Madras Presidency 1851). This was the first and foremost of water law affecting the tanks of the present day Tamil Nadu. A summary of provisions from the BSO are listed in Annexure 9, the list of Statutes – state level enactments in Annexure 10 and central enactments in Annexure 11.

The first serious work on studying Indian water law made by the Indian Law Institute (ILI), (Singh 1992; 1991) did not have any review of the BSOs. The same is the case with very recent and extensive works done by various academic and policy research projects such as the International Environmental Law Research Centre (IELRC) (2009; 2011; 2012). To cite examples, a recent compilation of 'Water law in India' by Cullet and Koonan (2011) and 'Water and the Laws in India' by Ramaswamy Iyer (2009b) did not even list the BSO as an instrument in the hundreds of statutes listed and discussed in them. They create an image that Indian water law constitutes the statutes made by legislatures and case laws made by the courts.

Some of these studies and projects continue to hold a notion that Indian water law is a mosaic held together by English common law principles that has well defined water rights[4]. They tend to treat India, the nation-state, as one unit in

[4] However, Sengupta (1998) argued that in India rights are poorly defined and the colonial and post colonial bureaucracy is not even capable of understanding

studying the water law. Also they believe Indian water law is passing through some momentous changes (Cullet and Koonan 2011, 2). Contrary to such claims, this chapter elaborates the provisions of BSO that remain static, and based on colonial principles to maximize land revenue. They neither subscribe fully to English common law nor adhere to the pre-colonial principles applied to tanks. This chapter also argues that there is no such momentous change in tank related water law for more than a century. When it comes to the large areas irrigated by tanks, ground water, river diversions and other river valley projects very little has changed in law. Therefore it is appropriate for me to start with understanding the instruments like the BSO.

Origins of the Board and the BSO

In essence, the BSO are a series of executive instructions given by the Board to their revenue officers in the Madras Presidency to administer land, water and other resources that bring money to the government.

Regulation I of 1803 of the government of the East India Company defined the duties and extent of powers for the Madras Board of Revenue as if it was a legislature. This regulation with 58 sections is one of the longest at that time and envisaged many powers to be given for the Board. The Board had powers to punish the highest revenue officer of a district, the District Collector, and regulated all matters related to land including waters from rivers, channels and tanks. The Board members had to swear an oath of allegiance to the company, and refrain from business involving any money transactions with the natives. Breach of oath could invite members to be downgraded from their positions and face prosecution by the relevant criminal laws of England[5].

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different water systems across the country, let alone define the water rights (Sengupta 1998).

[5] Regulation I of 1803, *s3*

This regulation of 1803 also established the relationship between the Board's opinions and the courts as: "Although the opinions of the Board are not to be a rule for the guidance of the Courts of Judicature in deciding suits, yet they may be taken as evidence, and must be held to be of some weight in matters connected with the land and land revenue (Sloan 1862, para 24 of p 187)." This over the years led the courts to accept the BSO as main source of law related to the land and water. The Board was also empowered to 'alter, amend and enlarge' their own orders[6]. Thereby the Board even though an executive body acted as a sort of legislature in making laws. In the initial years of the Board, the courts did question their executive orders in several occasions related to land assessments and water projects. In one such case in 1833, the governor of Madras opined that

> The interference of the Zillah courts in cases like the present is a question materially involving the interests of the Government, and the punctual realization of the public revenue. If their competency to try such to be recognized, it is manifest that either the law requires modification, or that our present system of *ryotwari* annual settlement must be abandoned (Board of Revenue, Madras Presidency 1866, 436).

The law settled since this time and the courts did not entertain suits questioning the powers of the government in matters related to land and water assessments. The power of the government related to land and water is thus defined through the BSO and applicable even today.

Powers of the Bureaucracy

The power to assess the land (to generate land revenue for the government) is assumed to be the most important aspect of establishing control over water sources. The board did not follow the English common law; rather the principles and doctrines used in *ryotwari* settlement are a hybrid developed from both the English and Indian customary principles. Pre-British customary law of the pre-

[6] Regulation I of 1820, s5 (2) authorises the Board to alter, amend, and enlarge, these rules, from time to time, as occasion may require. (Board of Revenue, Madras Presidency 1851, 5, para 2 dated 26th June 1820)

colonial Madras differed substantially from the English Common Law and at times contradicted it with regard to land and water[7].

The power held under these BSO was challenged in courts on and off but still holds good to this day. In 1902, in a case related to the statutory power of the Board to make assessments (fixing land taxes), the Madras High Court held that such a 'right of the government is not a right created or conferred by any statute *but* a prerogative of the Crown according to the ancient and Common Law of India[8]'. The court distinguished the understanding of the government's power to assess land and water under the common laws of England and India. It observed, "..it is probably true that the Crown has according to the Common Law of India certain prerogatives which it may exercise in India though not in England, notably the prerogative of imposing by an executive act of assessment on lands and varying the same from time to time." Similarly in 1904, the Madras High Court once again upheld the process of making assessments but only cautioned the revenue assessment shall not go beyond what the land can produce[9]. The assessments are therefore limited to the productive capacities of the land but the powers to assess remained as before.

The same question of whether the government has the 'right to assess land and water?' using the BSO came again in 1958, well after the transfer of power from British rule. A farmer from Tiruchirappalli argued in an appeal that these BSO are mere executive orders without any statutory authority given by any statute made by the legislature. He cited Article 265 of the Constitution of India (1952), which provided 'no tax shall be levied except by authority of law'. Since BSO is not

[7] S. Iyengar refers this as 'Indian Common Law' (1933, 14). Some judges and their pronouncements in the Madras High Court also use such terms to distinguish English common law from Pre British Indian law. I borrow this term just to indicate the salient difference between Indian and English common law systems related to water.

[8] *Bell v. Municipal Commissioners for the City of Madras [1902] MLJ 79*

[9] *Madathapu Ramaya v The Secretary of State, [1904] ILR 27 Mad 386.*

backed by any known statute they have no authority of law under the constitution of India. The Madras High Court, after discussing the growth of revenue law in India, ruled that the BSO did have the statutory authority and therefore the law making powers of the Board of Revenue, and the orders issued by them, were legal[10]. The court in the same case once again reiterated the views of Baden Powell by recalling him that the BSO is 'the Land Revenue Code of this province and no one can thoroughly master the revenue administration without studying these in details'. Thus, the role of bureaucracy and its power in making these laws still continues. Today, therefore, water conflicts of every nature between *ryots,* and between the government and the ryots, and their collectives are decided mostly using the BSO in courts.

Constitution of the Board of Revenue

As per the regulation I of 1803, the Board of Revenue consisted of a President (always a member of the government), three ordinary members, and an additional extraordinary member. It also had a Secretary, two deputy Secretaries and an engineer of officer's rank from the PWD. Excepting the engineer member all others were from civil services. The first and second senior members need ten years' experience as officers, the Secretary and Deputy Secretary four years. Most of them had extensive service in districts, e.g. as Collectors and were aware of all the *nitty gritty* of land and water issues. They were amongst the best paid officers in the presidency. The engineering members were at the bottom of the hierarchy of the Board. The District Collectors acted as agents of the Board of Revenue to interpret and implement their orders[11]. The Board determined the questions by the majority, the President, or in his absence the senior member present had a casting vote. The orders of the majority had to be carried out. The proceedings of the Board were referred to the government as a matter of record. Two members were competent to form the quorum for the Board and two meetings required to

[10] *S. Gopalan v State of Madras Represented by the Collector, [1958] (71) LW 672*

[11] *Regulation I of 1803*

be held every week. At times, when needed, the Board could commit any specific duty to any particular member. The junior most member in a meeting must record his opinion first in the meeting and others followed till the president at the end. Even after 1947, similar process existed until it was wound up in 1980.

As Bernard Cohn (1996) observed, East India Company (EIC) functioned like a state in their days and these orders cannot be simply misunderstood as proceedings of a business concern. Bernard Cohn observed,

> The East India Company had over time acquired many attributes of a state, in European terms. It could wage war, make peace, raise taxes, and administer justice to its own employees and to increasing numbers of Indians who inhabited the territories in which the company was acting as the sovereign (Cohn 1996, 58).

According to him, the visionary imperialist Wellesley wanted the EIC staff as someone 'destined for high office in Europe' and to get trained in the branches of literature and sciences needed in India. His vision of training "the staff required special instruction in the codes and regulations of the Company, as well as in the true and sound principles of the British constitution". As Wellesley believed, they truly acted as "ministers and officers of a powerful sovereign. (cited in Cohn (1996, 49)". Cohn's works, offer insights into the composition of the officers of East India Company who shaped the laws in India especially the land revenue laws. His synthesis on "Colonialism and its forms of knowledge provides a narrative of how Indian society was restructured using the acquired knowledge of pre-British India by the colonial bureaucracy (Cohn 1990; 1996).

Similarly, scholars specialising in eighteenth century India, believe the roots of land settlements especially the ryotwari system of land settlement has to be traced to the "rhetoric of benevolence" and "agrarian patriotism" ideologies held by the officers of the Company Raj as a measure of integrating the natives into the Company rule. According to Bayly (1998), this 'agrarian patriotism' meant "measuring, settling and making the land pay"- was the guarantee for the long term stability of empire (as cited in (Alavi 2002, 40))

Whenever needed, the Board of Revenue sought the views of the Collectors on specific issues other than their regular reports. In the case of important water laws, such as the Compulsory Labor (*Kudimaramat)* law, the Board called for the reports of 'the existing practices of community labour, views of the Collectors and district engineers to mobilize in the present' from all districts. Based on the reports of Collectors and district engineers it formulated the rules for mobilizing collective labour under the *Madras Compulsory Labor Act 1858* [12]. Similarly, when establishing private rights on ground water the Board consulted the Collectors and encouraged to promote wells and discouraged any efforts to charge additional assessments on well irrigated areas (Cox 1895, 171).

5.2 *RYOTWARI* LAND SETTLEMENTS: ADMINISTRATIVE REORDERING OF SOCIETY

As we had seen above, the origins of the BSO was well laid between 1786 and 1857 by the EIC, a commercial enterprise interested in financial profits. The land settlements originated by the EIC, took note of the existing land tenure system and adopted some aspects and left many others in devising the land revenue policy. The major consideration for the government was to raise the land revenue collections by bringing more and more lands under cultivation and irrigation. This is done in addition to entirely appropriating all possible incomes from common properties such as forests and tanks.

Understanding *ryotwari* system is important and relevant because, *ryotwari* is the present mode of land settlement covering the entire state of Tamil Nadu[13]. The study of *ryotwari* settlements of the Madras presidency is mostly done by legal scholars and historians in order to understand how different types of land

[12] Tamil Nadu State Archives: 70-71 of 1860 of the Public Works Department (PWD). The chief engineer of the PWD as a junior member of the Board consolidated the views of the district officials and submitted a memorandum to the Board.

[13] Other states that follow *ryotwari* include most of Andhra Pradesh, Maharashtra and Gujarat; parts of Odisha, and Kerala.

settlements in India happened and their impacts on Indian economy and social life[14]. My discussion here is limited to the specifics of land and water law alone.

Ryotwari Settlement

The land settlements in Madras started with an overt assumption that the government of the EIC had the 'proprietary possession of all lands'. They used the Madras Regulation XXV of 1802[15] initially to settle some tracts to *zamindars*, as the EIC did in Bengal[16]. Creating an intermediary class of feudal lords responsible for collecting land revenue was the aim but this failed. Further, these efforts came

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[14] Baden-Powell examined the merits of different land settlements from the point of establishing lasting property rights on land. His examination subjected the rytowaris also, and from a legal point he conceded that the *ryotwari* is a creation of the bureaucracy without any statute laws to back it up (Baden-Powell 1892). Nilmani Mukherjee offers a description of the early days of the *ryotwari* settlements and its impacts in Madras based on archival investigations of the various models and experimentations done in different parts of the presidency. His discussions cover the early period (1792-1827) of the *ryotwari* settlements in Madras while the company was actively promoting *zamindari* and other types of settlements elsewhere in the country (Mukherjee 1962). Burton stein offers insights and reasons from the life of Thomas Munro who spearheaded the *ryotwari* settlement with a missionary zeal (Stein 1989). Munro's views of 'liberating' the peasants from the clutches of a cruel and undefined revenue system into a kind contractual relationship with a government is well known from his biographical studies (Arbuthnot 1889). Post colonial scholars have evaluated the economic effects of *ryotwari* system and observed peasant insecurity through these legal systems, and found no better than the *zamindaris* (Bagchi 2010, 194–241).

[15] *Regulation XXV of 1802* declares "the proprietary right of lands to be vested in individual persons, and defining their rights of such persons, under a permanent assessment of the land-revenue". The *s 1 of the Regulation* detailed the 'injustices' of the regimes before the British in assessing the land revenue "granted to *zemindars*, and other landholders, and their heirs and successors a permanent property in their land for all time to come; and to fix for ever a moderate assessment of public revenue on such lands, the amount of which shall never be liable to be increased under any circumstances (Sloan 1862, 74)".

[16] See Guha (1963) for a discussion on the various assumptions and policies behind introducing *zamindari* settlement in Bengal.

into conflict with the Pre-British tenure systems[17] that had placed different rights and liabilities with the *ryot* as well as the government. As a consequence, another regulation *(Regulation IV of 1822)* was brought in to specifically declare that the government is 'not intended to interfere with the actual rights of *ryots'.* These *ryots* were those who tilled the land at that point in time and hence the law 'recognized all their rights'[18]. Thus, in two thirds of the Madras presidency areas, the government, instead of creating the intermediary *zamindars* as originally envisaged in the law of 1802, resorted to settle lands directly to those found working on them. In the words of Thomas Munro, the chief architect of *ryotwari system*,

> The ryot is certainly not like the landlord in England, but neither is he like the English tenant. If the name of landlord in England belongs to anyone in India, it is to the ryot. He divides with Government all rights of land. Whatever is not reserved by government belongs to him. He is not a tenant at will or for a term of years. He is not removable because another offers more. The case, it is true, sometimes happens, but it is always regarded as one of injustice. He holds his land, or *putkutt*, by inheritance, as long as he pays the public assessment upon it. That assessment has, under the native princes, always fluctuated and been a great bar to improvement. It is our object to limit the demand upon his land, to secure him in the possession of it. And thus to render it valuable property". (Arbuthnot 1889, 32).

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[17] According to S.Iyengar, typical villages in the Madras presidency areas (of Tamil and Telugu speaking) had four different types of assessments within them. They were *(i)Warapat, (ii) Tirwapat, (iii) Tarisu, (iv) Poromboke*. *Warapat* are cultivated wet lands pay a crop share to the ruler/king; *Tirwapat* are cultivated dry lands pay a fixed tax; *Tarisu* are waste lands or lands not put into use; *Poromboke* are either lands incapable of cultivation or land set apart for a future use. In case if they are assigned for someone or an Institution of public importance it is called a *manyam* and not assessed for tax. (Iyengar 1933, 39).

[18] *Regulation IV 1822, s2*: "It is hereby declared that the provisions of *Regulations XXV,XXVIII, XXX of 1802*, were not meant to define, limit, infringe, or destroy, the actual rights of any description of landholders or tenants; but merely to point out in what manner tenants might be proceeded against, in the event of their not paying the rents justly due from them; leaving them to recover their rights, if infringed, with full costs and damages, in the established courts of justice (Sloan 1862, 376).

Thus Munro saw it as liberating the ryots.

The legal positions with respect to land are that *the ryot came before the sovereign of the day* and land cannot be taken away from him. Unlike the English common law (that conferred all lands to the king), the Indian traditional law recognized the right of the first occupant on land as an absolute right[19]. Also it recognized two rights simultaneously – (1) of the sovereign (or his assignee), and (2) of the *ryot* (holding individually, or as a member of a joint family, or village community). According to S.Iyengar,

> The sovereign has a right to demand revenue in the shape of a share of the produce from all cultivated lands which is liable to variation at his will and which is known as *Rajabhogam, Melwaram, Melpadi, Metikoru or Metipalu* which has now been commuted in ryotwari tracts to a money payment; and the share of the cultivator is known as *kudiwaram, kilpadi, karu or medepalu*. All other interests in land are derived from the one or the other. Subject to the payment of his share, the sovereign has no right to the possession of lands. While he dealt with his interest in land, the ryot dealt with his (Iyengar 1933, 14).

The same principle was adopted into the *ryotwari* where the EIC's government represented the crown and land holder is the *ryot*.

The government took a share in the produce and that was fixed at 'half-net' of the produce that the soil can yield[20]. This share was called the land revenue

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[19] *Secretary of State v Vira Rayan,* [*1886] 9 ILR (Mad) 175.* Sir Charles Turner C.J. and Muthusawmy Ayyar J. of the Madras High Court Observed: "According to what may be termed the Hindu common law a right to the possession of land is acquired by the first person who makes a beneficial use of the soil." The dispute was about government staking its claim on a large land and river bed in Bhavani river, and the court wanted the government to prove its title which the government failed. So, it held the occupier has a right over the river bed. In the same way, *Madras Estate Lands Act 1908* recognises the occupancy rights of the *ryots* in *zamindaris*. This includes lands occupied on tank beds, channels and river beds etc.,

[20] John Briggs provides a survey of land revenues claimed by the sovereigns of ancient nations in Europe and Asia. According to him, the Indian sovereigns normally collected around one-sixth of the share from the land. The

'assessment' and it was started to be collected in cash from the *ryot*. Water became part of the land and charged along with the land.

The principles[21] to assess the land and waters in *ryotwari* were considered as '*rational'* by the government and include the following:

(i) the government shall assess the land solely on its productivity rather than any social parameters[22];

(ii) classification of lands shall be simple and scientific;

(iii) assessment should not be more than half of the produce derived from the land;

(iv) there can only be two classes of lands as wet and dry based on the use of water; dry lands be assessed only once in a year and wetlands of double cropping can be done twice[23];

The government's demand represents the government share of the surface cultivation done by the *ryot*[24]. While fixing this demand from the *ryot*, the

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Mohammedans in turbulent times collected nearly half of the produce from the land, and the British followed them and adopted the same rate as their standard (Briggs 1830). According to him, this rate normally followed during wars is not justified to be followed during normal times by the British.

[21] BSO.1 Rates of assessment. This BSO establishes the principles of the land settlement. Most of these were established in the early days of *ryotwari* and consistently followed.

[22] There are eight types of soils from Class I to Class VIII, of this class I to IV are cultivable lands, Class V to VII not suitable for cultivation, Class VIII not suitable for cultivation, pasture or recreation purposes. On the whole, the state of Tamil Nadu has 188 different rates (133 for wet lands, 55 for dry lands) (Arul 2005)

[23] There are five different sources of water– Class I supplying throughout the year; Class II for 8 to 10 months; Class III for 5 to 8 months; Class IV 3 to 5 months; Class V- less than 3 months. Most of the tanks fall under Class IV and V and some linked to the rivers and canals fall under other classes (Arul 2005)

government also took away the cess collected for tank maintenance along with it[25]. The same principles are followed even today in determining the assessment.

[24] BSO 1.1.8.3. "What the government demand represents?: The assessment thus represents the commuted value of the Government share of the surface cultivation..."

[25] Discussing this practice of taking away the 'maintenance tax' Arthur Cotton wrote regretfully that 'What the Indian Prices did' was not done by the British government. Cotton cites the submissions made by Norton, J.Bruce, a senior civil service official of the Madras government in (1854) to the Public Works commission decrying the land revenue methods introduced by the British proved detrimental to tanks. He cites Norton's submissions as follows:

> "The native princes, who constructed the tanks and channels of irrigation, knew quite well that from their very nature they must stand in need of constant repair. They therefore made a special provision for this necessity by subjecting every acre of land irrigated to a special cess (or this particular purpose, which was in some instances contributed by the ryots, and in others, in equal parts from the ryots' share and the Government share of the produce, the revenue being in those times received in kind.
>
> …..After the assumption of the government by the English it was determined [in the *ryotwari* system] to consolidate all the items, making up the land revenue into a single demand,... In that operation the tank cess was included in the settlement, and was merged in the revenue; and the correlative duty of maintaining the works of irrigation in efficiency was fully recognized on the part of the Government. (sec. 454).
>
> …..It thus appears that it is not simply a question of policy whether the Government shall keep the works in repair, nor even that there is a merely implied engagement to do so, but that it is a positive and express obligation to be fulfilled in return of an equivalent received. It must be admitted that this duty has not been performed, and private property has suffered great damage in consequence; and it now remains, therefore, to retrieve the past neglect, and bring up the works into a state of full efficiency as rapidly as possible-(sec. 465).
>
> (Cotton 1900, 302).

However, such a 'correlative duty' was never recognised. Rather the enforcement of compulsory labor was brought in using a law in 1858.

In order to administer such a huge number of land holders the previously existing village administrative systems needed re-organizing. So, the village accountants and servants like the *Nirghanti or Neerkatti* (water managers) serving the village as an Institution now became government servants overseen by the District Collectors appointed by the EIC[26].

What does the BSO[27] deal with?

As of 2013, the BSO contains a total of 213 orders[28], of which 12 deal with land, water and tanks together and an additional seven exclusively deal with irrigation (water and the tanks). Most of these were made in the early days of the land settlement between 1820 and 1850 but minor changes have been incorporated. Most changes are in the procedures defining the relations within the various departments of the government from time to time.

With respect to tanks and water, the important enactments such as the *Indian Easements Act 1882*, and *Madras Irrigation Cess Act 1865* and its many amendments, merely reinforced the BSO rather than making any substantive changes to them. Also, there are not many BSO that were quashed or contradicted in the courts citing any of these Acts, or any other contradictory legal doctrines used in them. Rather, they were time and again reinforced

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[26] See (Iyengar 1933, 32–52) for a discussion on the pre-existing village servants and their transformation into government servants in *ryotwari* settlements.

[27] BSO is organised into 20 chapters- Land and water administration in ten chapters, and routines of Revenue Department in 6 chapter; and the rest about miscellaneous and extraordinary functions of the government.

[28] First compilations of the Standing Orders were made in 1851 by John Maskell (Board of Revenue, Madras Presidency 1851). By 1900, the government published a standard compilation (Madras (India: Presidency),Board of Revenue 1920) that is followed till today. There existed different versions in between these periods. Ajmal Khan et.al (Government of Tamil Nadu 2007b) updated the compilation of the last government edition appeared in 1977 (Government of Madras 1977). These compilations again follows the same ordering fixed in the year 1900.

through many of the landmark judgements related to water discussed in chapter 6 and 7.

Revenue considerations and the tanks

It has to be understood that all actions regarding either the development of tanks or disposing of tanks for other uses always arose from revenue considerations. It is hard to find any reference to suggest anything contrary to this phenomenon. To begin with, the *ryotwari* settlements had declared all tanks, rivers and streams belonged to government and empowered itself to dispose all types of lands[29]. Some lands that are expressly reserved, such as the forests, and lands with government buildings, are exempted. Lands that may be useful for 'public purposes' in future are also not expressly included, but it was at the discretion of the local officers to define what public interest was. Definitions of public purposes or public interest was kept very fluid and varied over time. For example, in case of forests, reserved forests are for the government and cannot be given away to *ryots* for converting into cultivable land and Local forests closer to rural habitations on the tank foreshores were allowed to be accessed by the *ryots* for firewood collection. When deforested areas became waste lands they could be alienated and given to those interested in cultivating it. The foreshore of the tanks and tank beds could also be settled by the *ryots* if the officers determined it was not functional and incapable of generating any revenue or if it was not required for the public interest.

Similarly, defunct or ruined tanks[30] that cannot be revived in a financially benefitting manner were also disposed[31]. A ruined tank is one that has lost at

[29] B.S.O.15 Grant of lands for occupation subject to payment of assessment

[30] B.S.O *8.1 Definition of a ruined tank*: The BSO existed even before 1920. It specifies the tank is in disrepair for five years and last its 25 % of the irrigable area. Some minor changes were introduced in 1935. The change was about including a monetary limit of the estimated loss of revenue from a defunct tank.

[31] BSO-16 *Disposal of Tank - Bed lands*. This BSO allows the disposal of rank bed lands to any British subject including British nationals since the year 1818. Such a

least three fourth of its *ayacut* in the last five years in normal circumstances. It was not known how many were disposed using this BSO[32]. When a tank bed is disposed, it brought again additional revenue to the government. The tank *ayacut*, if any was left at the time of disposal of the tank bed, was divided into pieces and disposed once for all. It could even be sold to Institutions if there are any takers. This situation has not changed even in the twenty first century, and as it stands now the tank beds of the defunct tanks shall be disposed in the same manner using the same provision. These disposals do have an implication in the technology of tanks, for examples the channels connecting such defunct tanks and functional tanks might be destabilized or wiped out depriving or reducing water to functional tanks. There are many tank villages that have claimed their channels have been wiped out in the past in such disposals causing their present, reduced water supplies[33].

Even today, the right to dispose a tank or its parts, channels or its margins, delimiting the *ayacut*, continues to be exercised by the government without any rights given to the *ayacutdar*s who are actually using the tanks. Some implications of such powers are discussed in chapter 8 through the case study of Palani tank, where the government disposed a part of the tank bed for uses that are harming the very existence of the tank and affecting the user farmers.

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sale was allowed even today with some modifications in the procedure set in 1818. Under this BSO, the Government order no.550 dated 07-04-1875 suggests such non-performing tanks be divided into convenient plots and sold or given *patta* to whoever wishes to cultivate them as dry lands. Apart from this, the BSO 15 deals with disposal of all lands such as forests, wastes, coastal, swamps and also tank beds.

[32] Abandoning of tanks continued throughout and in 1931, the Administration report of the PWD estimated, if tanks irrigating less than 10 acres are abandoned, "[it]meant the giving up of a revenue of Rs 54,000 derived from 9,700 tanks irrigating in the aggregate about 45,000 acres (PWD 1931, 8 para 10)". The inference could be abandoning of tanks must be going on since the BSOs came into existence.

[33] Based on the Focus Groups Discussions and visits to tanks and channels in Villur, Thennamanalloor, Ilanthaikulam and Alangulam tanks.

5.3 What belongs to whom? Private and Government Ownership

In the initial years of the nineteenth century, property rights over lands and waters held by the government such as communal forests, rivers, channels, tanks and pastures were not defined clearly. They were referred as government 'belongings' and later as 'properties'. But it was made clear in the earliest settlements that it 'belonged' to the government for the purpose of developing it, exploiting it, and collecting any revenue including water cess for use of water from sources including the tanks.

Madras Irrigation Cess Act 1865, is one of the earliest irrigation law, its *s1* simply reaffirmed the power of government to levy a cess whenever water is supplied or used for purposes of irrigation from any river, stream or channel belonging to government or constructed by the Government. Even before this statute existed, the government did create many new small and large irrigation works; repaired existing works like tanks and river channels, anicuts through the Revenue Department. The government always considered that it had such a right in the interests of the public to develop and regulate water. Some examples include the largest schemes like the Coleroon in Cauvery, Sangam in Pennar, Godavari and Krishna schemes and countless small tank works including the closing of breaches. After accomplishing such works, the government levied additional land revenue on account of water provided through the new projects.

Controlling the rivers

Rivers are always held under the control of the government and administered by the Board of Revenue. The BSO did not allow any planning and construction of irrigation works on rivers even if they were proposed by a riparian sitting on the banks of the rivers[34]. It explicitly disallowed them unless they had a custom or a

[34] This is just the opposite of riparian rights as understood in English and French water law. See for a discussion about the basis and growth of riparian rights in Teclaff (1972)

prescription to take water from the river. Also, the 'law of prior appropriation[35]' is not considered as valid[36]. The right to decide about any such request was solely the preserve of the Board of Revenue[37]. This particular BSO came long before the *Indian Easements Act 1882* that explicitly declared that government have absolute rights over all waters in India[38]. Contrary to the view held by many that the *Indian Easements Act 1882* was the source of the government's monopoly of waters, such a provision always existed in the BSO.

Apart from the rivers, the BSO established different paradigms of water, such as 'government water' and 'private waters', through its various provisions. From all waters being government water, it travelled to a stage that water on private lands

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[35] According to Tarlock,

> "Under the law of prior appropriation, water rights are allocated to the first person to put a specific quantity of water to beneficial use. The user obtains a temporal priority, and in times of scarcity, the right to withdraw or pump water is curtailed in reverse order of the manifestation of an intent to appropriate. The most junior user right holder must yield to the more senior and so on along a stream system or, in theory in some states, in a ground water basin" (Tarlock 2000, 882).

In case of tanks, it has to be understood as the first tank formed in history gets the first right to fill water from the stream or river and it proceeds next.

[36] *Robert Fischer v Secretary Of State [1908], 2 Ind Cas 325*

[37] B.S.O.10.8 *Rules inapplicable to Rivers*:... "Applications to construct irrigation works in connexion with rivers will be dealt with specially by the Board on report from Collectors." This is based on the Board Proceedings 5534 dated 04-09-1863. This BSO was removed in 1945. By then, explicit legislations like the *Madras Land Encroachment Act 1905* declared 'Rivers' as one of the many government properties and made the previous orders redundant.

[38] *Indian Easement Act* 1882, *s2 (a*) "right of the government to regulate the collection, retention and distribution of the water of rivers and streams flowing in natural channels, and of natural lakes and ponds, or of the water flowing, collected, retained or distributed in or by any channel or other work constructed at the public expense for irrigation."

was private water and water flowing in rivers, streams and channels over government lands became government water.

Government Water

As we saw earlier, BSO treats land and water together for the purposes of administration and taxation. It generally divides the lands into two types as Wet Lands and Dry Lands for the purpose of revenue assessment. Wet Lands are those irrigated by rivers, channels, tanks etc., Dry Lands are those normally dependent on rains (that fall on the lands) and water received from below the ground through wells. When lands were settled to the *ryots*, the government claimed all the sources of irrigation such as tanks, *anicuts*, channels, and rivers 'belonged' to it[39]. Thereby all rivers, tanks and other irrigation sources even the wells became government property[40].

Even though the government collects assessment for water, it does not need to ensure water supplies to any tax paying *ryot*. Though the *ryotwari* land holder is ordinarily told he is entitled to the customary supply of water from the government sources, the corresponding obligation of the government is negative. This means that while the *ryot* is bound to pay through land revenue assessment, the government is not responsible to deliver any assured water. Hence no claims shall be made in courts even when charges are collected for the water[41] when

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[39] BSO - 4, 5, 7, 8, 9, 10 and 11 differentiates 'government water sources' from 'private'. BSO-79 to 89 deals with the irrigation especially the rights of the government, construction, control of water supplies, and procedural matters related to conservancy.

[40] Nearly a century after the settlements have begun the *Madras Land Encroachment Act 1905* reaffirmed the water sources like the 'tanks, rivers, and streams' as government property for the purpose of exercising its rights to evict encroachers.

[41] *Sankaravadivelu Pillai v Secretary of State [1904] 15 MLJ. 32; Secretary of State v Muthuveerama Reddi [1910] 20 MLJ 869*

crops fail. Kumarappa, the Gandhian economist surveying after a Taluk under similar *ryotwari* settlement in the Bombay presidency remarked

> Irrigation tanks bring in revenue to the government whether they hold water or not. In, any case the Irrigation rates are charged on the adjoining fields and the dry parts of the tank are let out on rent for cultivation. Even here the Irrigation department takes care of its dues more zealously than the shylock himself (Kumarappa 1931, 39).

Going one step beyond, the BSOs even cautioned when private persons contributed to building tanks that 'they must be distinctly informed that the works on completion will become the property of the government'[42]. Water from all tanks, rivers and streams are declared as 'government water'[43] and written permission is needed from the revenue authorities[44] to use them for irrigation. Here again, the government considered all waters as its own property.

Every water that originates in any government land that includes unassessed wastes or forests held by the government departments is considered 'government water'. In the same way, water users taking water beyond the defined *ayacut* of any tank are also declared 'unauthorized users' who can be penalized[45].

The advent of hydroelectric systems in the twentieth century brought another dimension to this control. Even the historic users of any running water for irrigation from rivers and streams running inside the reserved forests have been

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[42] BSO-84.2 Right of government to regulate the distribution of water: This BSO is based on the Board Proceedings 296 (Settlement) dated 17-10-1913

[43] BSO-4 Water cess on dry land: the BSO details the various situations in which government water should not be taken for use.

[44] BSO -4.10 Sanction for taking water: expressly declares "no government water is to be taken under these rules without written sanction".

[45] In such cases the assessments were compounded to penalise the use beyond defined *ayacut*s in any tank.

put under a licensing regime since 1956[46]. Presently, the scope of licensing them will be determined by the Forest Department[47] and the Revenue Department jointly.

Apart from the Revenue Department, PWD and the Panchayats, BSO has brought the Forest Department that is in many ways a policing department rather than a civil department[48] into water management.

It has to be kept in mind that only very few surface water sources such as tanks and canals were created by the private after these settlements. The government undertook most of the larger irrigation schemes like the Godavari, Krishna and Cauvery and some small works of tank rehabilitation mostly from government funds. In short, the colonial government took over the entire tank irrigation infrastructure as its property, solely to make revenue from it either by fully or partly rehabilitating it or by dismantling it.

Private water

Water that shall be generated from the runoff within someone's field is accepted as private water, and allowed to be stored *within* the field. This is again subjected to the condition that it does not affect any government source that would have benefitted from such runoff. The water should only be used by the concerned *ryot* in his particular field and may not be exported elsewhere.

Differentiating government and private

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[46] BSO 4.13 Streams in reserved forests, Board Proceedings Ms. 1327 dated 22-08-1956

[47] BSO-4.13 Streams in reserved forests based on the Board proceedings of 25-09-1956

[48] An example of their control shall be understood from their objection even to renovate a defunct tank supply channel on the fringes of a reserve forest in Thiruvallur district even after the District Collector wanted the channel to be renovated (as reported by DHAN Foundation teams in Thiruvallur in 1998).

The differentiation between the government and private water is made in the form of water cess charged for water. The rationale for fixing water charges is based on the amounts of water consumed by the cultivators. Normally, the first crop of a wet land is charged with full rates, half rates for the second crop, and no charge for third crop[49]. In case of crops such as sugar cane and betel vine that stand for two years, they are charged for each year[50]. Even when water is bailed from government sources by buckets and carried in pots they are charged[51]. In case if the land is a designated dry land but gets incidental benefits from a tank or any other government water source, water cess is still applicable. These charges are applicable even when trees like coconut groves are planted bordering the streams and rivers[52]. In the end, all the surface water that flows in the rivers, streams, jungles and stored in naturally formed pools and manmade tanks became absolutely 'government waters'. Then, all tanks and regulated river channels became government sources[53].

Private rights over surface water

Until 1949 private efforts to construct tanks were allowed subject to conditions laid out on the property rights over the stored water and the bed of the tank. Firstly, such new construction of tanks should not affect the existing government

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[49] BSO.5.1 *Rate of Assessment*- (i)Second wet crop on single crop wet lands

[50] BSO-5.3 *Second crop charge* (a) officers competent to charge (b) levy on portions of field

[51] BSO.5.5 Deduction for bailing, BSO-5.2 Dry second crop on wet land

[52] *Secretary of State v. Mahadeva Sastrigal, [1916] 40 ILR (Mad) 58*

[53] BSO - 4, 5, 7, 8, 9, 10 and 11 differentiates the government sources of water with private sources. BSO-79 to 89 deals with the irrigation especially the rights of the government, construction, control of water supplies, and procedural matters related to conservancy of irrigation sources. BSO- 211 deals with Fisheries village Panchayats. s2 of the *Madras Land encroachment Act 1905* reiterated water sources like the tanks, rivers, and streams as government property for the purpose of exercising the rights to evict encroachers.

works; secondly it should not submerge anybody's private lands; thirdly the land under submergence will also be assessed for dry rates and finally the newly created *ayacut* will be assessed as wet. The water thus created and used by private individuals was not given any remissions or concessions in water cess and is at par with any other wet land. These orders were based on the proceedings of the Board in the years between 1854-58[54]. Even for the tank bed the owner has to pay the land tax[55]. This order changed later, stating that the owners need not pay for the waterspread (water stagnating area when the tank is full) but it is sufficient to pay for the irrigation area created by the tank.

In the same way, tanks that are in a state of disuse and ruin shall also be turned over to individuals as well as to village communities on agreed terms of reduced assessments. The BSO reiterated that whatever is the case and circumstances of the *ryots*, once agreed they must not fail in paying the increased land revenue assessment.[56] Here again, there is no concern for the tanks *per se* but they are considered as pieces of land to make whatever the revenues that can be possibly generated from every piece of land.

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[54] Refer to BSO 7. *Private Construction of Tanks* (from the 1920 edition). This appears to be repealed and only repairs to the ruined tanks were allowed by the private.

[55] (Board of Revenue, Madras Presidency 1866, 90 order no. 125):

> "a ryot who constructs a tank is to pay the assessment of so much land covered by its water spread, as shall have been cultivated within ten previous years. If that area belongs to private parties the constructor must compensate him by giving land in exchange".

[56] BSO.8.8 Repair by village community. The BSO says,

> "..Whether the ryots of the village unite to repair the tank or leave the work to one or more of their member or even to stranger is a matter of no consequence to Government, "it being understood that all ryots holding land under the tank have agreed to its repair and to pay the stipulated rate of assessment to government".

5.4 BUREAUCRATIC CONTROL OVER TANKS

Even though many different statutes came in the last two centuries and more notionally affecting tanks, nothing really changed in the administrative apparatuses dealing with them to enable the elected local bodies and user organizations. In this section, I show how the offices of the District Collectors as established by the East India Company exercised powers over the tanks. Even today in (2013), the control over tanks and waters is left with the government Revenue Department as it was established long before.

The Revenue Department

Often it is overestimated and misunderstood that the Panchayats and the PWD are given the legal powers to deal with water related issues. A plain reading of the Panchayat laws and the rules issued there gives such an impression. However, on matters of ***controlling and deciding*** about the rights over water the Revenue Department holds the ultimate control even today through the BSO.

As we know, larger works including tanks that irrigate over 100 acres and system tanks that are part of any river system are 'vested' with the -PWD. This segregation between 'large and small' came into effect in 1852 under the BSO. That is when the PWD came into existence as a separate technical department. This 'vesting' needs some explanation to understand what in reality it means in law.

The PWD are 'vested' with powers 'to control the distribution of water supply within the tank *ayacut*', however they can only 'exercise their power subject to special or general directives or any supplementary instructions which may be issued from time to time by Government'[57]. Here, the government means the Board of Revenue and in its absence (since 1980), today the Revenue Department.

[57] BSO-84.1 Control of Water supply in whom vested

The District Collector or his deputies such as the Thasildar (sub district chief of Revenue Department) or other Revenue Departmental officers take a lead in all these matters. They represent the 'government' at the district level and hold the deciding powers using the BSO. When there is a dispute in the tank at an *intra*-village or inter-village level or tank level, the revenue officers alone handle the situation irrespective of it being a big or small tank held by Panchayat or PWD[58]. Even today, all water disputes within a tank, or between tanks or between cascades are handled only by the Revenue Department, and the PWD or the Panchayats are not legally expected to do the same.

Panchayats and Tanks

Among Indian planners and scholars, some belief exists that reviving village administration in the names of Panchayats will lead to better management of resources such as the water. Such a belief on making Panchayats as an effective local government always existed even in the colonial government and also in the national freedom movement (Sarasvati and Dharampal 1972). However such beliefs were never realized on the ground, and debates continue endlessly in achieving the same. See some related discussions specific to tanks of south India in Vani (1992). Therefore, the reasons have to be found in the colonial laws especially land revenue laws that in essence prevent such enabling laws like the various Panchayat Acts since the beginning of twentieth century.

Even though Panchayats were an ancient concept in many parts of India, only the *Government of India Act 1919* envisaged them in definite legal terms for the country as a whole. This law also aimed to allow participation of local people in governance by establishing local bodies in a limited manner. In this regard, *Madras Village Panchayats Act 1920* was enacted and the law carried Minor

[58] I have observed such a role played in the micro level studies referred in chapter 9. The revenue officers are the ones who dealt with all the disputes and neither the PWD nor the Panchayats of the respective villages had any role. Even when these departments are asked to state their position in court they adopted the views of the Revenue Department.

irrigation (MI) as one of the functions that can be handled by Panchayats. Transferring of the smaller irrigation systems like the tanks to Panchayats has been talked about since then. After the transfer of power in 1947, debates of reviving Panchayats were re-started on different ideological grounds that they were an ancient mode of Indian rule and needed to be rejuvenated. Thus a new law named *Madras Village Panchayats Act 1958* was enacted. However, as far as tanks were concerned, nothing changed. The law carried the same sections related to tanks as in the 1920 Act. Only in 1966, rules were issued by the Board of Revenue to transfer certain 'irrigation functions' to Panchayats under this law as it was done in 1852 when PWD was started. Thus, the small tanks with less than 100 acres of *ayacut* are vested with Panchayats for irrigation functions.

In 1966, through executive orders, the responsibility for 'certain irrigation functions' was transferred to Panchayat Union councils (or the Block level Panchayats). This secondary layer of local bodies had a small number of staff (usually two overseers and one engineer in all) to execute all engineering works such as road laying, tank repairs, building wells and drinking water systems etc., However, they did not have any specific staff to do anything with the tanks as desired by this transfers[59]. The government **assigns** the following functions to the Panchayat union councils:

> (a) protection and maintenance of irrigation works, (b) the management of turns of irrigation and (c) the regulation of distribution of water from the irrigation work to the fields depending on it. The Panchayat Union council may entrust the above functions to a local Panchayat if the *ayacutdar*s under the irrigation source so request in writing and the Panchayat concerned agrees by a resolution passed by a meeting specially convened for the purpose to take over the said function and abide by the

[59] On an average, there are around 84 tanks per every Panchayat Union in Tamil Nadu. Since the year 2000, each Panchayat Union has two engineers and two overseers. Prior to this period one engineer and one overseer served a Panchayat Union. They are expected to handle all the maintenance and management of these tanks in their jurisdictions. Since they have many other works apart from attending to the tanks, they have very less time left to do anything systematically in the tanks.

> conditions upon which the irrigation source had been transferred to the Panchayat Union Council[60].

Until the transfers happened, the tanks irrigating below 100 acres of *ayacut* were directly administered by the Revenue Department with no role for Panchayats even in paper[61].

Compulsions arose once again in the form of the 73rd amendment to the Indian constitution that the village Panchayats be empowered as a measure of promoting local governance under the constitutional scheme. *Tamil Nadu Panchayats Act 1994* was enacted and the law carried the same provisions as in the past related to tanks. The specific rules about the irrigation functions, maintenance and management of tanks, ownership of water remained the same as in the past. Under this law, minor irrigation including tank irrigation became one of the 23 sectors envisaged as the responsibilities of Panchayats[62].

Since 1966, the Panchayats have had no manpower and resources to do such functions satisfactorily even today. Even the water managers *(Neerkatti)* in tanks continued to work and report to the Revenue Department and not to the Panchayats. In 1999, the new set of rules issued by the government once again declared the irrigation functions of the smaller tanks as transferred to both the Panchayats and Panchayat Unions[63]. So nothing in real terms has happened in

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[60] B.S.O 84.1 Control of Water supply in whom vested

[61] G.O.Ms.no.1154, Revenue, dated 6th April 1966 and Board Proceedings (Permanent) no.1315 (H), dated 27th September 1966.

[62] An average Panchayat has five or six habitations. Every Panchayat has a part time clerk to collect house taxes and attend to some petty works within the village. It may not be a surprise that the elected representative and the part time clerk may not even know what is in their list of responsibilities the constitution of India has given to them.

[63] Rules *3.3.15 para 5* issued under the *Tamil Nadu Panchayats Act 1994, s133 (1)* says,

> The Village Panchayat or Panchayat Union Council, as the case may be, shall have the power to regulate the manner and order in which the lands

these laws and in practice till date. Therefore, the status of law and practice remains as it stood in 1852.

Tanks and the PWD

Since the days of the formation of the PWD in 1852, the responsibility of bigger irrigation tanks with over 100 acres of irrigation remained with the PWD. This act of giving responsibilities to a technical department is once again misunderstood as if the government has really transferred the 'powers of controlling waters' and 'irrigation functions' to the PWD. Though it appears so, the fine print applies here. The BSO specifies only the District Collectors have the rights to 'regulate and control' water supplies from tanks during water shortages[64]. Most tank conflicts arise during the scarcities that need quick and local resolutions in the middles of crop seasons which cannot be done by the PWD unless the District Collector takes interest in addressing the issue. Thus, the PWD cannot do anything based on their technical wisdom. However, the same BSO specifies, in normal times, that the actual operations of sluices shall be the responsibility of the tank village headman, who is mostly hereditary or honorary village elders[65]. Thereby, all the

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> in the village under the irrigation work shall be irrigated, the time at which the supply of water shall commence, the period during which the supply of water shall continue and the total quantity of water to be supplied. G.O.(Ms).No. 222, Rural Development (C-4) Department, Dated 20th October, 1999)

[64] BSO 84.2 Right of government to regulate the distribution of water; and 84.3 Restriction of irrigation in seasons of short water supply

[65] BSO 84.1.*Transfer of irrigation functions to Panchayat Unions* s(iii)... In the exercise of such functions, the Panchayat Union councils shall also have general control over the *nirghantis*[Water manager], if any, employed by the government. The Revenue Department shall, however, *retain over the nirghantis the power of appointment, punishment and dismissal. Payment due in respect of the nirghantis shall also be made by the Revenue Department. (emphasis added)*; 84.1.(v) the Panchayat unions shall not effect any alteration in the sluices of the irrigation tanks. 84.1 (x) the maintenance of all irrigation works transferred to the Panchayat union council shall be under the control of and supervision of the Panchayat union Engineer (block engineer or Supervisor as the case may be) and shall be subject to inspection by the Revenue Divisional Officer.[Revenue

talk of transfer and control remains only in paper and never realized on the ground. It is simply a plain ignorance that many activists and scholars continue to believe and expound the merits of Panchayat laws in bringing local management in water resources like the tanks.

Participatory Irrigation Management and Turnover

Providing rights and responsibilities to the users in distributing water was taken in up in the past three decades. In the eighties, a new set of projects and Institutional arrangements were announced to seek the participation of the users in water management. These projects came in the name of Participatory Irrigation Management (PIM), Irrigation Management Transfer (IMT), and Command Area Development Programme (CADP). They are mostly funded by the Central Government, USAID, World Bank, ADB, and European Union (EU). These projects have spent huge resources to form irrigation societies at various levels. But none of these societies were given any real powers in law to control and manage the water. *Tamil Nadu Farmers Management in Irrigation Systems (TNFMIS) Act 2005* introduced water management societies in the PWD list of tanks. The law was a part of the World Bank funded water resources consolidation programme (WRCP) in Tamil Nadu. Though the law in its objectives envisages water management functions for the societies, no real powers are given to them.

Therefore, when it comes to 'controlling water' every such society formed so far under these projects is subjected to the same provisions under the BSO which gives the ultimate responsibility to the Revenue Department and the District Collector. In none of the tanks visited and studied for the research, and the many case laws referred in the next chapter, neither the Panchayats nor the PWD is a party responsible to litigate on behalf of the government. Only the Revenue Department and their staff represented the government interests in all tank

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Divisional officer is an immediate subordinate of the Collector and head of the Revenue Department in the division and has no relationship with Panchayats].

litigations. Only when some technical questions arose and plaintiffs desired the PWD come into the scene and endorse whatever the Collector states in his reply.

In summary, the substantive law to control the water and administer the tanks in the last two centuries remains the same and the rights to have control over waters are held by the Revenue Department and executed by the District Collector and his deputies.

5.5 Snatching the common revenue and Failing collective action

Just like the water use, other tank uses and usufructs are also controlled by the Revenue Department. Tanks are in need of constant maintenance and upkeep. Major rehabilitation works may not be needed every year, nevertheless cleaning up of channels, removing bushes and shrubs on the bund and channels, cleaning and levelling field channels are routine activities that have to be done every season. The funds required for doing these routine functions historically came from these valuable usufructs. The proceeds realized from the trees, fishery, silt and sand were the source of funds for the *ryots* collectively to do this job.

Since, *ryotwari* system has made tanks as government 'belonging', the revenue from these usufructs also belonged to it. It is true that the government continued to allow some of the customary enjoyment of usufructs in certain places which is subjected to *kist* (tax). The custom is always subject to proof whenever there is a dispute. Customs related to the use of fishery revenue is sometimes recorded in the A-registers of villages, and the holders of such right need to pay a tax for enjoying the same.

If no custom is codified, the fishery has to be auctioned and added to the government revenue[66]. In some cases, such revenues are meant for the temples who in turn would lease it to specific groups or caste groups involved in fishing.

[66] The BSO notifies, "The village, tank, and channel fisheries of each district should be rented out annually. The revenue shall be credited to Local Accounts" (Board of Revenue, Madras Presidency 1866, 341 order no.345 dated 27 Novmeber 1850). The legal position remains the same even today. Presently the Panchayats

In the vast majority of tanks the revenue from trees and fishery reached the government as an additional source of revenue[67]. Customs have to be noted in the A-Register or Settlement register to be protected from government capturing it. After the Panchayat law of 1994, the incomes from the proceeds of fishery and trees are transferred to Panchayats. The Revenue Department is authorized to auction the proceeds and the proceeds of sale are sent by the Department to Panchayats through an accounting process[68]. Therefore, the Revenue Department still holds the key to decide about this matter.

So the arrangements for the usufructuary revenue presupposed a radically different type of communal agrarian relations that contradicts property rights as established under the BSO. The government and private paradigms visualized under the BSO and many other laws that followed them did not help the tanks in anyway rather they were detrimental to tanks.

As of today (2013), the fishery has to be auctioned in public[69] by the Revenue Department. Trees on tank bunds[70] held by individuals have to pay a usufructuary

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were given such revenues instead of the Revenue Department. However, collecting such revenue still rests with the same Revenue Department. It may be said that it is a notional transfer happening across the departments.

[67] Similar system of collecting fishery revenue in some forms prevailed in *zamindari* settled areas as well. *zamindari* is technically a different contract wherein the intermediary is responsible for fixing up the rent for land with ultimate cultivator. The government claimed the incomes from the tank and channel fishery are not part of a *zamindari* contract and hence will be taxed under income tax. Normally, the agricultural income from lands is not taxed both in *zamindari* and *ryotwari*. It appears the government wanted all that common revenue from the tanks even in the *zamindari* settlements (*Commissioner of Income Tax v Sevuga Pandiya Thevar, [1932] 63 MLJ 634 cited in* (Iyengar 1933, 67)).

[68] *s132* of *Tamil Nadu Panchayats Act 1994* and the rules there under prescribes the procedures for auction of fishery and other such revenues. They were the same in the previous two Panchayats Acts of 1921 and 1958.

[69] BSO-211 *Fisheries*

[70] BSO18.2.b.Scattered trees and topes

charge as fixed by the Revenue Department. The planters of such trees can only avail themselves of the withered and wind-fallen twigs, shadow of the trees and not the tree as a whole. In the event of the tree falling down the Revenue Department auctions it and takes the revenue. Apart from this, in hundreds of tanks, the right of tree planting has been given to the Forest Department under Social Forestry Schemes. Though there exists no consolidated data for the state of Tamil Nadu, one list in Madurai district alone claimed that there are some 620 tanks under their plantations and control[71]. The *ryots* cannot plant any trees individually or collectively and avail themselves of the usufructs anymore. Finally, the BSO allows the community to enjoy the tank beds for cultural uses and grazing their animals[72] free of charge[73]. In summary, all revenues from the tanks were taken by the government and even if the *ryots* collectively wanted to plant trees, and cultivate fishery there is no room left in law. This is one major reason why farmers have rejected the role of maintenance of tanks altogether.

Relationship between tank maintenance and usufructs

The BSO was made with the simple understanding that all the revenue acquired from a government property must reach the government. The historic obligations of tank maintenance were met with such common revenues from tanks and were taken away by the BSO. On the other hand the government wanted customary labour to attend to the tank repairs under the *Madras Compulsory Labor Act 1858*. Many scholars including historians (Baker 1984), irrigation specialists

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[71] An undated list of tanks under social forestry plantations held by Forest Department in the former Madurai district (presently Madurai, Dindigul and Theni) reveals 620 tanks are in their control. Some tanks are shown as taken over in the year 1962, and many in the later years. Field visits to six tanks from this list confirm that these tanks are still held by the Forest Department even though there are no plantations at this time.

[72] BSO 86.8. Communal rights in tank beds

[73] Even this right is challenged by the Forest Department that claims their plantations would suffer if animals enter. This phenomenon is observed in the Tanks studied during the field work.

(Maloney and Raju 1994), and anthropologist (Mosse 2003, 242–264), studied the linkage between the failure of irrigation laws, decline of tanks, and the participation of the locals in maintaining the tanks. Baker suggests the Irrigation Bills aiming to improve irrigation in general including maintenance of tanks were prevented by the *zamindari* lobbies resulting in stagnation or decline in irrigation (Baker 1984, 475). Mosse believes the colonial government did not "take over and undermine an institution (*kudimaramat*) belonging to the people (1999, 310)" rather it is 'invented' by them to coerce the people to maintain the tank. However, their reasoning about the failure of maintenance missed a simple logic that why farmers should do their part of collective work (or compulsory work) when collective and common revenues such as the fishery, tree plantations, earth, sand and silt were taken away using the BSO.

C.P.Ramasamy Iyer, an administrator, a proponent of home rule and Panchayats in colonial times observed thus,

> Village Institutions which were formerly supported by common funds and labour are now decaying, and such things as the clearing up of rivers from silt, the construction of the new tanks and wells, defraying the up keep of schools and religious festivals at the common cost, are getting rare and rarer. (Iyer 1917, 27).

The statement made nearly a century ago remains valid even today because the source of common funds still belongs to the government. To date the same law and policy continues and the interests of the government and the *ryots* are in continuous conflict in these laws. I believe, as long as this conflict (i-e, revenue for the government and responsibility for the *ryot*) exists in the law, all efforts to bring farmers and their organizations to take care of tanks may never happen. If the *kudimaramat* law of 1858 failed in bringing the community participation in tank works, the same fate awaits the recent arrivals such as the *TNFMIS Act 2005* and the *Panchayats Act 1994*[74].

[74] The revised manual of Panchayats still carries the same procedures established originally to execute *kudimaramat* works by the villagers using *Panchayats Act*

There are several case laws that show the conflicts between the government and the village collectives or organizations over securing the last fishery revenues. As recently as in 2002, the Madras High Court came to the rescue of a collective body of 43 *karaiswans* (a specific type of right holders or *pattadars*) holding revenues from a tank in the temple town of Srivilliputtur that was taken away by the Revenue Department. The Court interestingly held that such a unilateral declaration taking away the collective incomes shall not be allowed unless a corresponding declaration to match usage of income for the common good. In this case, the holders are using it for a collective purpose of running a school[75].

Non-Government Organizations involved in tank development and establishing farmers management in tanks want at least the Panchayat laws to allow collective organizations of farmers like the Tank Farmers Associations (TFAs) be given some rights to generate incomes from the tank usufructs such as fishery, tree and silt and sand mining. The government has not relented even after successful experiments are shown as models[76]. The field studies show the village collectives bribe the revenue authorities and Panchayat officials to conduct a mock tendering process as required in the BSO. The representatives sent by village collective for such pseudo-auctions do a real auction later in their village grounds in a transparent manner. Real traders or fishermen participate in such re-auctioning fetching substantial revenues to the village organizations. The proceeds are used

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1994, s 133(2). The power to enforce *kudimaramat* thus has arrived to the village Panchayats (Palanithurai et al. 2007, First:241–242).

[75] *Alagar Iyengar v State of Tamil Nadu, (2002)4 LW 498,* In the Madras High Court. The judgement also reveals that the government tried several times to snatch the revenue in the last 100 years and the holders have successfully fought in courts to establish their case of using tank income for a collective purpose. This town is home to several legal luminaries known across the state and could fight against such orders, but others have had to surrender or adopt other means such as bribing the bureaucracy.

[76] DHAN Foundation. Policy Brief 9. “Resource Mobilisation for Rehabilitation of Tanks with People’s Involvement.” Available at http://dhan.org/cpp/pdf/policybrief9.pdf [Accessed 15 March 2013].

for tank maintenance, tank rehabilitation and for many other village collective works. If many tanks are well maintained this is one of the reason where the law is violated wilfully by the *ryots* in a collective manner[77]. It is once again obvious that the roots of the conflict lie in the law which was based on the ideas of mobilizing greater land revenues from the land and water for the East India Company's government.

The failings of tank maintenance by communities are an area of study that the scholars have debated extensively. Their suggestions cover the need for a law to enable them, training the local bodies and associations, hand holding such associations to use government projects, facilitating local participation and so on. However, taking away the common revenues from the tanks using the BSO resulted in such failures. Therefore, rather than blaming solely on the breakdown of the Community Institutions, the problems of taking away finances from the tanks need to be understood.

5.6 Conclusion

Even though the *ryotwari* settlement was based on the premise that the *ryot* came before the crown and his land cannot be taken away using the Crown power, it was not the complete statement. The economic policy of the government which was based on establishing unending revenue stream from the land resulted in the complex web of 'government water' and 'private water' paradigm and forms the basis for the present water law. In both the paradigms, the land revenue policy was interested to maximize the government revenue at every instance of water use, and from other uses of tanks. I have dissected here

[77] According to the Secretary of the Tank Farmers Association of Kottaiyendhal tank, an amount of Rs 200,000 was mobilised by cutting juliflora jungles from the tank bed. The money was used for tank rehabilitation. Part of the tank bed was managed by the Forest Department, though there were no plantations. Rs 50,000 was collected from the departmental contractor to allow him to cut the trees. According to the Secretary, the contractor was allowed proceed with cutting only after he made the payment to the association. [Information is based on the interview and FGD held in the village on 12 February 2012.]

to establish the role of bureaucracy in making the laws like the BSO and keeping such a control over the tanks for long. Such bureaucratic methods are consistently followed even after the transfer of power. Though historians continue to suggest about the continuity of pre-colonial aspects of the Indian society the analysis of BSO in this chapter shows that this is a definite break from the past.

As Ramsay Macdonald summarized in his Awakening India, “We came to the village. We did not understand its spiritual or its economic basis…We surveyed lands and laid down definite boundaries; we created individual landlords; we established regular courts, which applied to India the property laws of the West (MacDonald 1910, 220)”. Such an observation is valid as far as the BSO are concerned. The law as given by the colonial rule (and preserved thereafter), especially the revenue laws under the BSO, continue to disallow and deny any role for tank farmers or their collective bodies in any form. The control is firmly exercised by the bureaucracy of the Revenue Department using the fine print of the administrative laws in curtailing the various aspects of enabling laws such as Panchayats and the Water Management Laws. If any improvement or changes to enable Panchayats has to happen, the foundations laid in the BSO has to be first shaken and the bureaucratic control on water and tanks have to be removed. When the bureaucracy exercises such a strong hold on the tanks and users, the courts were called in support of upholding the long held rights of tank users. The laws made by the courts are examined in the next chapter.

6. CASE LAWS ON TANKS

Having discussed the statutes and the standing orders dealing with the tanks, this chapter investigates how Indian courts have dealt with the tank conflicts and made a body of law (Annexure 12). Specifically, this chapter argues that the case laws made by the courts do not appreciate the technology behind the pre-existing practices. They have curtailed the science and engineering behind the practices within the limits of the nineteenth century European idea of property law and have thereby perpetuated the conflicts in tank systems.

The approach taken here is a legal analysis using the specific cases related to tanks, showing a clear trend in Indian water law in establishing government control over all waters under varied pretexts. Since the water law is always a combination of case law, statute and un-codified customary local practices, I have adopted common law analysis as well as an interpretation of the statutes as required.

Past analysis of Indian case law by scholars have usually looked at just the doctrinal principles (*ratio decidendi*) in them, and hardly focused on the context of such disputes, and the societal positions of the actors involved in them (facts of the case).

A typology of disputes that I chose are limited to those questions that arose while

i. *Challenging the government's powers and rights to tax more* for the water used by *ryots*
ii. *Challenging the government's powers and rights to control water* flows in rivers feeding tanks
iii. *Challenging the government powers in taking away* the communally-held usufructs from tanks
iv. *Challenging the government powers to dismantle tanks* in 'public interest'
v. *Challenging the failings of the government to protect tanks* and channels

Tanks are pre-existing systems, and the law (especially BSO and the statutes like the *Indian Easements Act 1882* and many other irrigation laws), and the court system are reasonably new compared to the life of tanks. Most, if not all, disputes, arose only when changes in the (pre)existing order was brought in by the government. The reasons for government actions varied over time – it could be seen as expanding the existing irrigation, bringing new irrigation, public purposes other than irrigation and so on.

Though there could have been many conflicts that have led to challenges to the government, I had taken only five major contexts for the discussion here. They are: (i) defining a river; (ii) defining a tank; (iii) protecting tanks from encroachments; (iv) customary rights of pre-existing users and tanks; (v) sustainable development and environment protection. I have not attempted to analyze the conflicts that arose between individuals, because the reported cases are far and few involving issues that are significant to this study.

Scholars agree that courts in India has played an important role in developing the water law (Cullet 2010, 328). But it is yet to be recognized that the case law has simply been developed against the pre-existed technical principles by which these tanks were operating until then. Further, the discussion here do not support the notion that the use of English common law principles lead to an incoherent water law in India (Cullet 2010, 328).

Rather the courts tend to confirm the administrative creations of government without bothering to adhere to any doctrinal principles on a consistent manner. The discussion also differ from the understanding that there exists towards a legal pluralism in India to accommodate customary principles of water administration (Bruns and Meinzen-Dick 2000). While such an understanding is valid at one level, it does not explain why only certain customs were done away and others left to survive. By chronologically taking up the cases (since the days of major irrigation projects commenced in tankfed areas), an attempt is made here to show that what has been done away by the case laws. They have significant importance to the tanks even today.

6.1 DEFINING A RIVER

Whatever be the geographical meaning of the river, it is required to be defined in law. Courts have played an important role in defining the 'river'. It did so when the pre-existing users challenged the government about its rights and powers to levy water cess in the name of irrigation improvements. Defining the river became important because (i) tanks get water from uncontrolled rivers and streams, and also from regulated river channels; (ii) a river may run within two differently settled areas such as *ryotwari (the government area)*, or *zamindari* (private estate), or in both at a time (one bank here and another there) or repeatedly cross both or in combination of the three possibilities. In those cases, how do you determine whose river it is?

The often cited *Urlam*[1] case arose between a *zamindar* and the government when the latter raised demands for additional levies. It claimed an improvement done *elsewhere* in the Vamsadara river enabled the *zamindar* to irrigate his estate more. The *zamindar* was a riparian and did not make any changes to the sluice vents or cross section of channels, and did not diminish any flows but was able to extend his wet cultivation. The extension of wet cultivation was real and noticed from the cultivation records. The government was able to substantiate that his increase is due to the project done by the government elsewhere in the river. On appeal from the *zamindar* against the government claim, the Madras High Court held that additional levy was applicable. It said that the river is a government property and water is supplied from a government river. The court decided this using the *Madras Land Encroachment Act 1905,* which declared the river as a government property, and the *Madras Irrigation Cess Act 1865*, which allowed increasing the irrigation charges when improvements are done by government

[1] *Kandukuri Mahalakshmamma v The Secretary of State for India [1910] ILR 34 Mad 295*

projects. The court also held that 'property rights' are held by the government over all rivers in India whether they flow through a *zamindari* or a *ryotwari*.

On further appeal[2], the Privy Council decided the matter on two different footings, whether the river 'belonged' to and also 'not belonged' to the government as a property. If it belonged to the government, the *zamindar* had a contractual engagement in the form of permanent settlement and hence he shall not be subjected to any extra levy that is not found in his original contract (in the assessment made at the time of settlement). If the river did not belong to government, but belonged to the *zamindar* (because it flowed through his village), he held a natural right as a riparian. So, on both counts the Privy council ruled he should not be taxed.

Even after this, what is a river and who owns it, and who can control it remained vague. Does the word 'river' means a geography *say* the bank or bed or the stream of water or all together or separately and if so in what ratio? The issue arose again in Madurai district[3] when a *zamindar* diverted flows from Maruthanathi river, a tributary of Vaigai into a series of tanks. He made an opening in the river bank within his *zamindari area* and this was objected by the government on the basis of ownership. A Full Bench of five Judges of Madras High Court decided unanimously that the 'ownership of a river or stream depended upon the ownership of the banks and bed taken together'. Therefore, whatever flows therein belongs to whoever is the owner at that place, subject to other riparian conditions of reasonable use. If any one of the condition fails, the river cannot be said as one that belonged to the government.

The reasons cited by each judge for their understanding behind their decision differed considerably if not contradictory. The same question again came up

[2] *Kandukuri Balasurya Prasadha Rao v The Secretary of State for India [1917] ILR 40 Mad 886*

[3] *Chinnappan Chetty v The Secretary Of State For India [1919] 36 MLJ 124*

before the Privy Council[4] and it ruled that the water belongs to whoever is the owner of the *solum* of the stream[5]. In the final analysis, it ended up in no strict doctrine. If water is a chattel to the land then the person on the outer bank also has a stake in the water flowing adjoining to it. However as we have seen in the above judgements that was not the agreed position by the Privy Council[6].

The only explanation that can possibly be given is that the courts tend to favour the government claims of property rights over all rivers in order to achieve a monopoly over water, which is seen as an economic resource for government revenues. This is done in one or the other pretexts since the land settlements. Interestingly, the definition of ownership came in a very different context that has nothing to do with a river or a tank or even about anything to do with water. This is discussed in the next section.

Today, this legal position in states like Tamil Nadu is that all waters belonged to the government. The government owns the up-streams (water facing sides) of all river banks and the beds. The adjoining land holders on the river bank with three sides on their land and one side facing the river shall exercise their 'natural

[4] *Secretary of state v Subbarayudu [1931] 55 Mad 268*

[5] *Solum* of the rivers often vary due to natural and manmade changes in its courses.

[6] In *Emani Lakshminarasu v the secretary of State [1918] 43 IC 113 Mad* the Madras High Court held that the 'riparian land must be confined to land which extends from the bank of a river to a reasonable depth in land, and that a depth of more than half a furlong would usually be unreasonable'. This means riparians can take water for free only when their lands are within a distance of half a furlong from the river bank. There is a contrary case law that actually extends who is a riparian. This dispute is related to taking water from Musi river for irrigating some garden lands. The lands on a single survey number adjoining the river even if extends for a km and beyond can also become a riparian. Here again, the definition of property in law (as shown by the settlement document) suggests who is and who is not a riparian. No technical principle involved in defining a riparian.

rights[7]'. Others a little away but not touching the river bank shall not be able to enjoy even this natural right. The courts through these above decisions, without any technological or geographical rationale, helped the government to secure such a monopoly over river waters.

This position led to the situation that even the tanks lying in the same basin without any pre-existing prescriptions may not be able to receive a fair share from the river rightfully (unless the government decides to intervene on their behalf). In a larger context, such issues resulted in many major regional imbalances in several river basins[8]. Some current conflict areas could be the tank-intensive river basins such as the lower Vaigai in Tamil Nadu and Godavari basins (constituting most of Telengana) in Andhra Pradesh[9].

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[7] There is no single understanding of what is being a natural right. See(Singh 1991, 21–24) . I restrict my understanding, to what has been said by the current Board Standing Order (BSO) for the purpose of this discussion. According to BSO-7.1 (introduced in the year 1949) *Natural rights* means "7.1.(i) Every owner of land has a natural right to collect and retain [water] upon his own land the surface water not flowing in a defined channel and to put it to such use as he may desire. A *ryotwari* holder has the same right. Officers of Government should not interfere with works constructed in the exercise of this right... 7.1.(ii).no water rates can be levied on irrigation from private surface water sources (including private tanks); 7.1.(iii) *ayacut* under private tanks will not be assessed as wet; 7.1.(iv) no charges to be levied from irrigation under seasonal pools of water"

[8] See (D'Souza 2005) for a discussion about the same issue in Tungabhadra basin in a princely state of Mysore.

[9] The consequences of such understanding led to few areas capturing the most water flows in a river passing through different settlement areas. Underdevelopment of tank intense Telengana region within Andhra Pradesh is one such consequence. While the *ryotwari* areas of Andhra Pradesh has multiplied their irrigation potential after the colonial rule and Telengana under Nizam rule remained one of the poorest and conflict affected zones in India. There are even folk songs abound in Telengana narrating their deprivation of waters from their rivers and streams, and consequential drying up of their tanks and deserted villages.

6.2 DEFINING A TANK (IN THE CONTEXT OF OCCUPANCY RIGHTS)

This section examines how the tank can be defined from the property rights created on land. In order to understand how certain types of property rights such as the occupancy rights or encroachers' rights are applied to tank beds and channel beds we need to recall our discussions related to the dynamics of tank as a technology system discussed in chapter 4.

In short, the space of the tank as marked in a Field Measurement Book (FMB) is a piece of land, which has multiple uses and users, and behaves differently over time and space. Time here has to be understood as a crop season, or across different seasons, or across many years. The space shall be a part of the channel or entire channel, or part of a tank bed or the entire bed. Since the colonial government took over the tank for itself (in *ryotwaris*) or handed it to *zamindars (in zamindaris)*, it needed to codify a nuanced practice over time and space in precise legal terms.

Occupancy rights in the *zamindaris*

In the *zamindari* areas, the occupants of the tank beds, bunds, and channels received occupancy rights subject to the property rights held by the *zamindar*. Many conflicts reached the courts when *zamindars* tried to evict the occupants in order to safeguard the tanks. *The Madras Estate Land Act 1908* defined occupancy land [called *ryoti* land] as a land that ***does** not* include the following:

> (1) private land, (2) tank bed, (3) communal land such as threshing floors, cattle stands, village sites, and (4) other lands which are set for common use of the villages and lands held on service tenure as long as it lasts. (Cited in Iyengar (1933, 197)).

The law took purely a technical view of exempting tank beds to be taken over by the occupants using the occupancy rights. However, different courts had a different interpretation of the same provision. According to Iyengar, the courts interpreted the same statute in different ways:

> The tank bed not necessarily means area under the water[10]. Nor does it necessarily include all lands within the bund of the tank, since they comprise dry lands held on *patta.* Tank bed is often cultivated when the tank is dry or when there is no water in it for a number of years, but such cultivations does not render it *ryoti* land[11]*.* The allowing of such cultivation by the *zamindar* is not illegal[12]. But when tank bed has continuously ceased to be used for the storage of water and lost its character as such, it becomes *ryoti* land[13] (Iyengar 1933, 197).

From Iyengar's summary, it is not very difficult to visualize a pattern. If some occupancy right holders want to take the tank bed as their land to cultivate, they can easily destabilize a tank, bit by bit. They may start with cutting off the channels first, leading to poor supply of water, and tank beds will shrink automatically, and over time when the channels are completely destroyed they might ask the administration to give the entire bed to them because it is not functioning anymore. This is exactly the way the present encroachers operate[14]. These rulings simply assumed tanks to be like any other piece of land, based on the notions adopted in the land settlement policies and the revenue documents issued from there. They are extremely complex, opportunistic and did not treat tanks as a technology which need some integrity to exist.

The concerns of the courts in these rulings revolved mainly around safeguarding the occupancy rights held by individuals rather than saving or reviving tanks that existed long before these rights were issued by the colonial administration. The disputes became very simple property disputes in courts and led to perpetual

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[10] *Boluswamy v Venkadadri Appa Rao. [1919] AIR MAD 506.*

[11] *Boluswamy v Venkadadri Appa Rao. [1919]AIR MAD 506.*

[12] *Chitravelu Servai v Samanna Ayyar 35 IC 108*

[13] *Narayanaswami v Samanna, 51 IC 318; Samayan Servai v Kadir Moideen Rowther 51 IC 899*

[14] DHAN Foundation. Policy Brief 1. "Encroachment of small scale water bodies: Emerging solutions for eviction." Page 5. Available at http://dhan.org/cpp/pdf/policybrief1.pdf [Accessed 31 August 2013].

conflicts in tanks. The scale of the issue before 1947 can be understood from the studies of David Mosse in the former *zamindari* estates of Sivaganga in Tamil Nadu. According to him (out of 160 cases identified from archival records),

> Forty four percent of the sample court cases [related to tanks] examined in Sivaganga concerned water flows and the interception or diversion of tank water supplies, and another 16 per cent concerned inter-village disputes over the flooding of tank foreshore lands or the deliberate breach of downstream tank bunds (Mosse 2003, 106).

This data shows how intense the conflicts are and we can connect it to the law as made by the courts as cited previously.

Today, it is very common in the *ex-zamindari* estates of Ramanathapuram, Sivagangai and Pudhukkottai where private lands are common in the middle of tank beds surrounded by water or even submerged by water. In almost every tank the actual water-spread area (based on the Tank memoirs) is much higher than the area marked as tank waterspread (specified in the village records).

Ryotwari settlements in these former *zamindaris* happened during the 1950s. However the occupancy *ryots* had already received their papers and the courts had made such a law. Hence the *ryots* had got permanent *patta* (land holdings) even when they occupy middle of a tank surrounded by water. In a tank chain with eight tanks named after Vallakulam tank in Ramanathapuram district, several conflicts due to this phenomenon is noticed. Of them, the submergence of lands in the foreshore is common. It was found that all tanks had less water-spread area in revenue records but when tanks become full they stood larger than the designated area. In some cases, it was about 40 % larger than the revenue settlement area. This means that such an extent of tank beds were already given to private landholders under the land settlements. Frequent quarrels and at times life threatening violent conflicts occurred in this chain between the tank bed farmers and the *ayacutdars*. While the *ayacutdars* want the water to be stored the foreshore farmers want them to be dispersed by breaching the bund or damaging the weirs(Seenivasan, *et. al* 1999)

The reasons for the continuing conflicts in tanks have to be traced to the documentation issued by settlements, and the various interpretations of land laws by the courts. These courts could not figure out the consequences of such interpretation of laws without ever attempting to understand the technology behind tank systems. Even researchers believe in the sincerity of the documents and considering them as 'real' while the tank structures become 'imaginary'. Mosse observed thus:

> They [the evidences] show that the meaning and purposes of any tank structure was not fixed but defined by conflicting representations of landscape; a gap in a tank bund could be constituted either as flood breach or the opening to a supply channel; the action of closing the gap as whether the repairing a breach to restore a tank's capacity or obstructing a customary (mamul) supply channel of the downstream tank. As endless appeals and reversals of judgement show, in arbitrating between competing definitions and in passing judgement on the mamul water flow, the courts of the colonial state struggled hopelessly to lock into an enduring set of rights, obligations an endlessly changing hydrology (Mosse 2003, 107).

After all, those who bring cases in the court to get back some lands will always argue everything that suits them. They have every reason to do so to claim their ownership or control over a piece of land, or water that belonged to a communal infrastructure. They might even deny the existence of a tank or a channel or any component. The right inference for the courts should have been to doubt the documents shown against the existence of a tank rather than doubting the existence of a tank. As we know, tanks and channels are real and existed for centuries but the documents were the creation of the revenue administration during the last two hundred years.

Today, in these districts, if many tank beds or channel beds are occupied it is just because of the property documents issued by the settlements. A single year does not pass without any violence or some quarrels related to this phenomenon.

Encroachments in the *ryotwaris*

In the *ryotwaris* the occupancy *ryots* are termed as encroachers. Even in 1856, the Board of Revenue conveyed its stern warnings to its officers and ordered the encroachments of water bodies punishable with jail terms. The village officers were made answerable to explain if there were any encroachments[15] in any lands including tanks in their jurisdictions. Encroachments on tank bunds were strictly prohibited even if there existed prescription with the occupier. In such cases, where cultivation happened for several years, the Board of Revenue advised the Collectors to purchase the piece of land rather than permit the same[16.] This is suggested to prevent breaches of tank bunds.

Until 1869, the legal position was that encroachments on tanks remained an offence punishable with jail terms. But then, the Madras High Court ruled that such offences are civil in nature and cannot be punished with jail terms (Iyengar 1933, 94). The government was left with devising a financial deterrent in the form of an additional levy from encroachers (through a special memorandum called B-Memo). This memorandum had to be issued annually after surveying the land under encroachment for its exact size and cropping. Such levies though called as additional assessments were in fact charged in multiples of the applicable assessment for an equivalent land. This suited the government objective of

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[15] The BSO reads:

> "Revenue officers should understand that one of their duties is to preserve both government land, and land now available to the public, as streets, squares, and open spaces....The disposition to make such encroachment is very common in the towns and villages of this country; and generally there is no one to resist them except the Collector and the Magistrate and his subordinates; it is desirable therefore that the Officer should both watch against such acts himself, and should enforce the same care on his Tahsildars and other subordinates (Board of Revenue, Madras Presidency 1866, 9 order no.19 dated 11 july 1856)".

The same provision exists even today in the BSO.

[16] (Board of Revenue, Madras Presidency 1866, 37 order no.58)

making more money through land revenue and was allowed to be continued until the dawn of twentieth century.

Penalties subjected to productivity of the land

Madathapu Ramayya[17], a householder challenged the government for raising such a high demand against him for his tiny piece of encroachment of a pathway in front of his house. The excessive amount was due to compounding of the actual assessment applicable for the land. The Madras High Court ruled that the powers of government are only to 'assess and collect land revenue' but not to make such exorbitant penalties that go beyond what the land can produce. The court held the interest of the government on land shall never go 'beyond what it can possibly produce'. So the financial deterrent in the form of exorbitant penalties could not be done from 1904. This has been a result of the case law.

Thereby, an encroacher can neither be penalized nor sued. Also, his lands cannot be taken away. In essence, there was no effective deterrent to prevent any encroacher. The extent of encroachments at this time can be understood from the newspapers of the times. The Hindu, a newspaper from Madras lamented in 1900 that,

> The tanks and lakes to be found in the country are too few, and for want of occasional digging up and cleansing are often found silted up and too shallow to hold any large quantities of water. Nor is any attention paid to improving the facilities for gathering rain water falling over large areas of land into existing tanks and reservoirs..... Within recent years, the tanks in many of the villages in several districts have become considerably narrowed in their dimensions by the aggression of owners of lands bordering them, and the quantity of water they hold is too small to leave any surplus available for agricultural purposes after their use for purposes of drinking, bathing, or washing. (Dated on 10th May 1900) Cited in (Cotton 1900, 335).

[17] *Madathapu Ramayya v Secretary of State [1904] ILR 27 Mad 386*

Government Ownership on tanks

To circumvent this judgement, the government brought in *Madras Land Encroachment Act 1905*. The law declared all rivers, tanks and many such water resources as government properties for the purpose of protecting them and gave powers to revenue officers under the Collector to evict anyone found to be encroaching on it, giving adequate notice and reasons for him to leave. As a result, any encroachments must be removed as soon as it is known to the government. This has never been materialized given the small number of revenue officers in the village resulting in poor enforcement and implementation of the Act.

This legal situation again means all tanks need to be checked each year by surveying. Such a task could never be humanly possible by the serving part-time village revenue staff. Even today, a board hangs in every Taluk office declaring that **eviction of encroachment is a duty** of the revenue officers. The Department has neither the staff strength nor the resources to carry out such evictions. As a result, the encroachments continued to grow, destroying and dismantling tanks and channels, with consequences such as ground water decline etc. Presently, this phenomenon has reached dangerous levels affecting almost a thousands of tanks[18]. In 2007, encroaching any tank was made once again a criminal offence.[19] Presently, there are six statutes[20], one BSO[21] and several executive orders[22] and

[18] There are 0.65 million encroachments on government properties in Tamil Nadu. Of these tank and channel encroachments amount to 0.30 million (*REVENUE DEPARTMENT POLICY NOTE 2012-2013* 2012, 53). The extent of encroachment could range from a few sq.m done on a channel for a house that chokes the water arrival, to several hectares occupied for cultivation in large tanks. Virtually, every tank and channel in the state today is encroached in some form.

[19] *s8* of *Tamil Nadu Protection of tanks and Eviction of Encroachment Act 2007,* declared encroachments in PWD maintained tanks as a prohibited activity punishable with three months of imprisonment or a fine of Rs 5000 or both.

[20] *Tamil Nadu Land Encroachment Act 1905*; (ii) *Tamil Nadu District Municipalities Act 1920; (iii) Tamil Nadu Panchayats Act 1994; (iv) Tamil Nadu Public Premises*

guidelines exist to deal with eviction of encroachments.

6.3 THE CASE LAWS ABOUT ENCROACHMENTS

This section examines whether the courts have considered the issue of encroachments in any different manner than they did so under the colonial courts and I argue that they have not.

In the last two decades, many cases reached the High Court and Supreme Court using Public Interest Litigations (PIL)[23]. The common feature in these litigations are that either the *users* (or their well wishers) of the tank sought the courts to issue *mandamus* against the government revenue secretary to implement the existing laws or the encroachers sought a *mandamus* to regularize their occupancies based on some extraneous legal or constitutional or humanitarian grounds.

(Eviction of unauthorized occupation) Act 1975; (v) Tamil Nadu Highways Act 2001; (vi) Tamil Nadu Protection of Tanks and Eviction of Encroachment Act 2007.

[21] *BSO-26 Unauthorised occupation of government land*. This BSO classifies the encroachments into three broad types: petty, unobjectionable, and objectionable. Tanks, rivers and channels come under objectionable encroachments. Procedure and responsibility for removal of encroachment is specified for each type.

[22] Government Order from the Revenue (Law) department no.41 dated 20-01-1987 narrates the usefulness of preserving even the dead tanks and channels to prevent the falling ground water levels in the state. It ordered all tanks be preserved for human and animal uses by declaring every encroachment be "*evicted without showing any mercy*" and the officers to understand this order as a "*permanent injunction to all such regularisations*".

[23] Normally, the irrigators do not have *locus standi* to force such an action on the government to act. A civil suit against the government in District Courts cannot be brought for this reason. However, High Courts and the Supreme Court treat these kinds of issues to consider it under the Public Interest Litigation (PIL) categories where *locus standi* is not strictly necessary. A search for 'encroachment' in popular legal database CDJ Law journal reveal over 150 High Court rulings from Madras High Court alone, of which many are PIL cases.

Encroachments are neither 'illegal' nor 'unconstitutional'

Activists petitioned the High Court[24] in 1993 to prevent the destruction of Porur tank, a large medieval tank close to the city of Madras, by encroachers. Apart from seeking the eviction of encroachments and taking actions against colluding officers, they sought the court to declare '*encroachments as illegal and unconstitutional as well as a crime against society*'. To support their arguments, they cited many reasons some technological reasons surrounding the relationship between tanks, man and nature and availability of drinking water, tanks and ground water, tanks and flooding, and loss of a valuable ecosystem.

They did invoke the then novel concept in India of 'sustainable development' that has arrived just in time at the Indian Supreme court. This included: the role of government in following sustainable development processes; India's commitment to international environmental conventions such as Stockholm Declaration (1972) and Rio Declaration (1992); ecological preservation necessary for a good life as envisaged in the fundamental rights of the India's constitution; and the State as a trustee[25] of natural resources (and not merely an owner). The government in court claimed it did everything to alleviate the situation but said the encroachers also had their titles in some form from many state instrumentalities (Electricity Boards, Municipalities etc.,) which need to be weighed carefully. For example, all houses on encroachments have electric connections, entitlements through ration cards, they pay house taxes to municipalities and hence eviction laws cannot be

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[24] *Consumer Action Group v Project Director and Member Secretary*, In the Madras High Court, W.P. Nos.17915 of 1993 & 25776 of 2006 & M.P. Nos.1 to 4 of 2006 & 1 of 2010 decided on 22-07-2010

[25] In *M.C.Mehta v Kamal Nath, (1997) 1 SCC 388*, the Supreme Court said 'doctrine of public trust' is part of the law. As per this doctrine state as a trustee is under legal duty to protect the natural resources and these resources meant for public use cannot be converted in to private ownership. It also held that in the absence of any legislation, the executive, acting under the doctrine of public trustee cannot abdicate the natural resources and convert them into private ownership or for commercial use.

simply used negating property rights or other occupancy rights held by the encroachers even though they are held in adverse.

The court took seventeen years to conclude the case and ruled,

> *there is no question of issuing a writ of declaration to declare that the encroachment in water bodies and water courses such as houses, bus stands, factories etc., are illegal and unconstitutional* (emphasis added).

Also it observed,

> Therefore the issue [eviction of encroachment] is essentially one of *changing the mindset of the people* (emphasis added). The Society has to take up such issues in the larger interest of the State. Mere issuance of a writ of *mandamus* or a writ of declaration would not serve the purpose.

The court did not answer any of the technological questions raised in the case, it did not decide to use the mandamus powers given to it by the constitution, did not fix the responsibility for not implementing the extant laws. But suggested,

> "petitioners as well as other public spirited persons to approach the administration at various levels, with details of encroachments in the water bodies, for the purpose of removal of such encroachments and to restore the water bodies in larger public interest."

In short, the court abdicated its constitutional and statutory role and left the government as the final arbiter to decide about the issue. In the final analysis, eviction of encroachments is subjected to many extraneous considerations unrelated to tanks as technology systems. In summary, the courts in post colonial India are no different as what they did in the last century when they dealt with the occupancy rights destabilizing the tank beds.

Identifying and removing encroachments: a graded approach

There are occasions when the High Court and Supreme Court have differed from the above said legal position and insisted the government to act and use the BSO and other encroachment law for evictions. In a case related to encroachment of channels and tank beds in Villupuram district, the Madras High Court ruled the government should evict the encroachers[26] and resurrect the tanks to its *original shape and size*. It agreed with the petitioners with applying the concepts of sustainable development and the precautionary principle to prevent falling ground water levels. Further, the court went beyond the case in hand and gave an overarching direction to the government

> to identify, all such natural water resources in different parts of the State and wherever illegal encroachments are found, initiate appropriate steps in accordance with the relevant provisions of law for restoring such natural water storage resources which have been classified as such in the revenue records to its original position so that the suffering of the people of the State due to water shortage is ameliorated.

There were District level committees formed in tank intensive districts like Madurai to survey the bigger sized PWD tanks and put up concrete posts as Survey stones. Though in many tanks the encroachments are made visible through these demarcations removing the encroachments were not done. The large number of small sized Panchayat tanks and channels even such a survey was not done in the same district[27]. It is not known for sure how many encroachments were actually removed based on this ruling.

As discussed in the previous section about defining a tank, the Supreme Court in 2011 ruled that the Government is under 'compulsory obligation' to formulate an action plan to find out and evict the encroachments in lands vested with the Village Panchayat and Local Bodies 'for the betterment of the community'. These lands according to the judgement included tanks also. However it gave a rider that,

> Long duration of such illegal occupation or huge expenditure in making constructions thereon or political connections must not be treated as a

[26] *L.Krishnan v State of Tamil Nadu [2005] (4) CTC 1. In Madras High Court*

[27] Based on the observations and discussions with farmers made during the field work done in Villur chain of tanks in 2011 in Madurai district.

> justification for condoning this illegal act or for regularizing the illegal possession. Regularization should only be permitted in exceptional cases e.g. where lease has been granted under some Government notification to landless labourers or members of Scheduled Castes/Scheduled Tribes, or where there is already a school, dispensary or other public utility on the land[28].

These riders again are redefining the tanks as it was done by the High Court in the previous century. Such riders do not help to safeguard the tanks. The alienation of a part of the tank bed and channels to poor sections of the society has always existed and did contribute to encroachments since the days of the British. The precise reason for the present litigation is to find the usefulness of such a policy and evaluate the technical appropriateness of keeping such policies. The legal understanding about the eviction of encroachment is that there is no technical or technological considerations necessary to give away a tank if the government desires so.

The respect paid for the Case laws

It is not known precisely how far these court rulings were adhered to however, nothing happened in many of the prominent cases that invited the attention of the larger public. As an example, in 2008, the Madras High Court ruled[29] to evict encroachments in 28 tanks in Chennai (Madras) city. The court also ordered:

- none of the district level civil courts to entertain any other proceedings related to eviction;
- the properties created on tank beds shall not be transacted in the registry;
- no notice be given for eviction;
- the government is authorized to use police forces to evict.

[28] *Jagpal Singh v State of Punjab, In Supreme Court of India, [2011] 3 MLJ 760.*

[29] *Anti Corruption Movement v Government of Tamil Nadu In Madras High Court, [2008] 1 MLJ 417*

Until today, the government did not act on the ruling and the situation remains the same in these 28 tanks as before. In the same period, another case was heard by another High Court bench at Madurai. It involved the demolishing of around 150 houses that were built on the edges of a tank bund and channels inside Sivakasi town[30]. The channel is blocked and the flows choked, the entire tank cascade suffered, and led to frequent floods in the town. The ground water levels in wells have fallen. Twelve years after the case was first heard, the court ruled to allow the encroachment and 'decided to regularize'. It considered the 'tank became useless (in the interim); ceased to be a source of irrigation; and the occupiers as deserving poor'. On appeal in 2011, the Supreme Court struck down this ruling and ordered eviction. But the judgement was not implemented yet[31].

Differing from this ruling, in another case involving a tank in Palani, the Court agreed with arguments about the need for the tank, its productive agriculture, for the future use. It ordered to evict private encroachments comprising some 600 houses[32]. This case was for contempt for not implementing the previous orders of the same High Court issued ten years before, which itself took nearly two decades to decide. The tank stands encroached and destabilized. Chapter 8 details the case and the process.

The courts just like the bureaucracy, push around these issues back and forth to the same bureaucracy to 'consider and reconsider' endlessly without concluding

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[30] *Sivakasi Region Tax Payers Association v The State of Tamil Nadu*, In Madras High Court Madurai Bench, W.P.NOs.16636 of 1995 & 22274 of 2007 and M.P.Nos.1 of 2007 & 2 & 3 of 2008.

[31] The Hindu. "Sivakasi eviction issue was foreseen way back in 1995." Updated: Updated: August 21, 2012. Available at http://www.thehindu.com/news/cities/Madurai/sivakasi-eviction-issue-was-foreseen-way-back-in-1995/article3800064.ece [Accessed 29 august 2013].

[32] *Uppliyanthittu Kamarajar Nagar Residents Welfare Association v District collector, Dindigul and Palani Vaiyapuri Kalvai Pasana Karaipathu Puravu Farmer's Association,* In Writ Petition No.7440 and 7552 of 2009 and Contempt Petition No.302 of 2009.

the cases. Even after all these rulings, in 2009, the High Court again wanted the government to reconsider eviction in another tank channel and a bed in Salem district[33].

In summary, even though the higher courts became aware of the dangers in allowing encroachments on the pretext of upholding property laws they neither force the government to implement the law, nor develop any sound legal principles to solve the issues. The prevailing case laws are as good as the government orders and statutes. These case laws are fragmentary, confusing, and contradictory. They cause uncertainty, present non-uniformity, have no consistent doctrinal basis and even lack an everyday understanding of water held by an ordinary citizen.

6.4 DECIMATING THE CUSTOMARY RIGHTS: ROLE OF COURTS

It is shown here that the courts played an important role in destroying the customary rights that survived the onslaught of the statutes brought after land settlements. This section argues that the statutes and the BSO accommodate these customary rights to an extent, but the courts over the years curtailed them and offered the government a monopoly and control. The chronological and a dispute-focused approach taken here demonstrates that the case laws resulted in decimating the long held customary practices in tanks.

Government monopoly over water

Conflicts arose between government and existing users when the former attempted to bring new projects by diverting waters from rivers used by the latter. Apart from understanding the rights and right holders over the rivers and tanks, several other questions about technology, practice, measurements, data, records, titles, and principles behind land settlements arose on these occasions.

[33] *K.Subramani v The district collector of Salem*, In W.P.No.27523 of 2007 decided on 09.12.2009

Some important case laws are discussed here to show how the courts adjudicated on and concluded these intricate issues.

Stage 1: 'Customary use' becoming an 'accustomed use'

The Madras High Court has ruled in *Robert Fischer v Secretary of State*[34] that rights of the government is paramount and over all the flowing waters. This is based on the understanding of the Easement law that gives such rights and powers to government. Also through this ruling, common law related to water use as practiced in England and India was differentiated[35]. Even though a plain reading of the *Indian Easements Act 1882,* did not envisage such a possibility of decimating pre-existing rights in this simplistic manner, the courts interpreted them in that way. This ruling was not *only* about the paramount powers over river waters but also about determining the fate of hundreds of tanks connected with Vaigai river for centuries. The detailed case study in the following chapter will show how the dependability of tanks in an entire basin was destabilized through this ruling within a few decades.

This case enabled a way for a many great transformations in the hydraulics of rivers, river channels and *anicuts* across them. When Fischer's case was heard in courts (1901-1908), the government was challenged in other places for taking away water to new areas to extend irrigation and maximize land revenue. The

[34] *Robert Fischer v Secretary Of State [1908], 2 Ind Cas 325*

[35] According to the common law of England, diversion of water by a riparian becomes an actionable wrong only when such diversion causes injury (reduction) to the other user, and shall not be allowed. In India the colonial government claimed it follows the footsteps of the pre-colonial rulers in developing irrigation and hence is empowered to control all waters and to take it to non-riparians as well. Their action in diverting water to non-riparian users (and uses) even while affecting the existing users does not amount to any wrong. It becomes a wrong only when a proof of damage is shown and established before the court.

courts in two such cases held[36] that

> the *ryotwari* holder is only entitled to claim that the supply of water required for the cultivation of his registered wet lands should not be materially diminished by any act of the Government. Subject to this condition, Government in this country has claimed absolute right to change the source of irrigation or the method of irrigation by which the *ryot* has been supplied and to regulate the use of the waters of all public or natural streams in the **best interests of the people** (emphasis added).

The use of the 'public interest' or 'best interests of the people' originated to substantiate new irrigation projects that affected the existing users negatively. This often led to limit the pre-existing rights of the *ryots* to '*accustomed'* water use.

However, what is an accustomed use was never known in precise legal or technical terms. Further there is no clarity of what is the time period in which these accustomed uses need to be determined. For example, the consequences of a newly established *anicut* may not be known for one or two years because the rainfall is cyclical and a very local phenomena. In a 'run of the river system' like Vaigai or Tamiravaruni known for extensive tank networks, the river was not stopped or diverted fully by any permanent obstructions using masonry *anicuts*. Even when such masonry structures existed, they were so uniquely designed in such a way that the entire flows cannot be manipulated. In such places, changing the hydraulics of weirs and channels would affect the existing users negatively. Some discussions are available in the chapter 7 about the Peranai *anicut*, a place of dispute in Vaigai.

In reality, the accustomed use not only means the quantity of water but the time and manner of release, sequence of release and so many other factors. Though the Easements law did not envisage such a possibility, the courts only interpreted the way the government wanted to execute their new projects. As the years

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[36] *Sankaravadivelu Pillai v Secretary of State [1904] 15 MLJ. 32, Secretary of State v Muthuveerama Reddi [1910] 20 MLJ. 869*

progressed, at some stage the courts started declaring even the 'accustomed use' as an 'unacceptable use' in the name of public interest.

This distinction was made in a dispute[37] about government diverting water from an existing channel to another village. In Thamaraikulam tank in Periyakulam Taluk of Madurai district, existing users enjoyed water from a channel *exclusively*. The channel was marked as one 'belonging' only to them in the revenue settlement records. The land revenue registers and records existed for the previous 100 years and was shown as their evidence in the court. The lower court, using the Easement Law and the BSO, agreed with the villagers' arguments and forbade the government action. The court also agreed with the villagers on technological grounds that the new channel bypassed them, affecting the existing order of water arrivals, and reducing the quantities even in normal times. The government was thus forced to restrain from the project.

However, on appeal by the government, the High Court interpreted that the prescription was *precluded by the relationship* between the government and the tank users. It held that though Thamaraikulam is entitled to the 'accustomed' supply of water, they could not acquire any exclusive right of the channel to challenge the paramount right of the state to '*regulate and control all supply of water in public streams and channels*'. Therefore, the users could not insist that the whole channel belongs to them even when their property records *clearly say so*. There are channels with prescriptions from time immemorial[38] in many parts

[37] *Secretary of State V P.S. Nageswara Iyer. In the Madras High Court [1936] AIR Mad 1923*

[38] For example, Kasakkudi copper plate (lines 115-117) belonging to 7th century A.D records a grant given to a village of Brahmins to draw water from the River Cheyyar and its streams. The village can have rights to excavate feeder channels, drainage channels in order to feed and drain their tanks. Anyone breaking into these channels even to bail water using buckets or mhotes or lifts, and any means of diversions done through temporary channels were expressly prohibited and punished. Similar inscriptions from the same period are found in the same region in other places too (Pullloor inscriptions line 126-128). Cited in (Santhalingam

of the state and all of them have been effectively removed by this ruling. The High Court thereby laid down a new dictum that the *prescription cannot give exclusive right* to deter the state. This lead to many technical issues and arrangements in tank chains in the later years.

For example, let us assume there exists a chain of tanks served by a single channel or stream running several miles. If the government desires to divert waters from a place just above all the tanks, in order to create or fulfil needs of a new settlement. Then, there may be a scenario that the lower down tanks may not receive their 'accustomed supply'. Theoretically the diversion will feed the new ones first even when there is an insufficient flow. Since all streams are rainfed and with unregulated flows (unlike water released from a head work), there is no guarantee that the flows in them can ever be predicted accurately. In years of less-than-normal rainfall, the lower down tanks usually receive less water, or delayed arrivals or no water at all in this situation. Therefore, a change of procedure in the ordering of tanks would amount to many serious consequences. But the courts did not understand why such previous practices existed.

The newcomers tend to gain the control over the entire channel and may affect the existing ones negatively. Proving an injury will be very difficult at the early stages since there exists no definite records of water flows in a given year or a season or in a day. Even today, all methods of computing runoff from the catchment are approximate and subject to wide variations and cannot be relied upon fully. Such a phenomena was highlighted in the High Court in a dispute between three hamlets belonging to a single village, Amathur[39]. They were named as per the sequence Chinna Amathur, Nadu Amathur and Periya

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2006, 7). It is a common refrain to hear from many villagers and elders that it is 'our channel meant for our tank'.

[39] *Lachuma Goundan v Pandiyappan [1951] 2 MLJ 658*

Amathur[40] and also located sequentially. The government changed the sequence and timing of the water release in the channel and affected one of them. Finally, when the dispute reached High Court on appeal the Court ruled that the government has powers to change such '*ordering of water release*'. Here again the accustomed use principle was emphasised. The court ruled as it did in Fischer's suit that any "damage to the *ryotwari* proprietor, actual or inevitable, is the gist of the action as well as the basis of Government's liability". Therefore, ordering the sequence by the government is also accepted as a law since then.

This ruling in the later years led to the principle of amending any and every existing rights, prescriptions and privileges enjoyed by the old users to benefit new projects. Hundreds of *anicuts* were newly built in *ryotwari* areas that had altered water flows by either changing the sequences or reducing the share of old users. Such a practice is continued till date[41].

Stage 2: Reordering the tanks through administrative actions

In 1983, going several steps beyond what was understood to be the law, the High Court ruled in a case[42] challenging government powers over altering the channel sizes, and flows to the old tanks that:

(i) There is no enforceable legal right to compel the government to maintain the status of a channel or a mechanism followed in the channel;

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[40] The names of these hamlets literally mean Small Amathur, Medium Amathur and Big Amathur indicating that they had some common origins and expanded over time and space.

[41] Periyaruvi stream in Madurai district was feeding 25 tanks from time immemorial until a new reservoir and a diversion was built in 1965, at a location above all the pre-existing tanks. Within thirty years after this diversion, 10 of these 25 tanks became dysfunctional due to the non-arrival of water in the stream. Villagers of these tanks blame the project for diverting their water to new areas (Seenivasan et al. 2004, 33–34).

[42] *Ponnu Thevar and Ors. v Arokia Nadar In Madras High Court S.A. Nos. 839 and 1864 of 1981* cited in *Sunda Thevar v The Collector Of Madurai [1984] 2 MLJ 451*.

(ii) There is no right over the bed or flow in any channel to the pre-existing users.

(iii) Consequently, the *ryots* cannot seek to maintain the *status quo* in terms of the machinery and contrivances being used in a particular channel or a sluice.

This case involved altering the sequence of feeding tanks in a tank chain, changing the dimensions of sluices and weirs and some other technological issues. This overarching ruling effectively meant that the government can do anything with a pre-existing system. This could be anything including changing the hydraulics of channels, changing the dimensions of the openings of sluices and vents, altering the silt levels of sluices, changing the sizes of shutters in weirs sill, and to fit *any and all* control devices that could affect the pre-existing users.

This above ruling was taken as a precedence by the same High Court to substantiate and approve government actions that were in the nature of damaging the very existence of a tank. In Urappanur tank with an *ayacut* of over 800 acres[43] near Madurai, a new road was laid in such a way that would split the tank into two parts with some consequences to the tank storage and water arrivals. The road affected the main supply channel feeding the tank and resulted in a lower down tank receiving more water than its usual supply. Consequently, the storage of the lower down tank was increased.

When Urappanur tank farmers challenged the government action in court, the government contended that under the *Tamil Nadu Irrigation Tanks (Improvement) Act 1949*, it had powers "to raise the full-tank level (FTL) of *any tank* or to take any other measure for increasing its capacity or efficiency". Using this statutory provision, which is meant for tank improvements, the government claimed it has increased the efficiency of *another* tank and hence their actions are valid. As in the previous cases, the Urappanur users could not establish any

[43] *Sunda Thevar v Collector of Madurai [1984] 2 MLJ 451*

damage due to government action by showing any damages to their tank immediately[44]. The Urappanur ruling led to the position that any action by the government affecting tanks would be approved in courts.

Stage 3: 'Accustomed use' becoming unacceptable use

Then came the Manjalar dam[45] case in Vaigai basin. In this dispute, unlike previous ones the tank users adequately demonstrated that (i) their customary use of the stream was not only blocked by a new reservoir built on the head reach, but their 'accustomed use' of water was negatively affected. The double crop became single crop and the irrigated area had been reduced by half. The district court agreed with the claims of petitioners (based on evidences of injury), and stayed the dam diverting water to new areas.

However, on second appeal to the High Court, the government argued India is not a *laissez faire* country but a socialist country and hence the government has a role to redistribute the country's natural resources. The court found it is perfectly right for the government to take water from double crop area and give to another water-deprived areas to ensure a single crop[46]. Therefore, the court said the suit

[44] I met farmers from the family of the village elder who unsuccessfully contested the case during my field work in September 2010. I heard the changes led them to suffer frequent distress and inadequate storages compared to their historic past. Also, they narrated this change led to violence between villages, and for over a period of five years a large police contingent was deployed in their village and the tank to prevent clashes erupting between them and the new beneficiaries of the change. The issue became a huge source conflict known across the district for its notoriety of violence.

[45] *State of Tamil Nadu v A.Abdul Karim, [1997] 2 MLJ 261*

[46] This project according to government is based on the Directive principles of state policies of the Indian constitution. Article 39 (b) makes suggestions to follow government policies that may redistribute ownership and control of 'material resources' of the community. These principles are of recommendatory in nature, and until this time none would imagine become a basis to take water from one village to another who share the same economic status.

by the tank users was '*unjust and inequitable*'. This decision is comical because, in other parts of the same district, there were projects implemented to benefit double crop areas through huge loan funds received from the World Bank at this time of the case.

Going several steps beyond what was raised in the case, the court also ruled no case of this nature against a government project shall ever be entertained in the lower courts. Since then, the lower courts *shall not issue any stay or any direction of annulling any scheme or project done in general welfare of the society at large*.

With this ruling, not only customary rights were taken away, but also property rights over water by the landholding *ryots*. It is very difficult to imagine such a ruling, at a time when India was starting to liberalize its economy by privatising its natural wealth including rivers.

Stage 4: No government action be questioned on the basis of 'rights'

The government onslaught continued further using the case laws developed by courts. When the users of Authoor tank in Tuticorin district in Tambraparani basin challenged the government action of diverting water from their channel into some other additional tanks, the lower court found such action legitimately diminished the supplies to them. Hence, the court stayed the project on that ground. However, the High Court on appeal not only rejected the lower court ruling but held such suits should not have been entertained in the first place[47].

Hereafter, the legal position became very straight forward. Not many suits are entertained in the district courts and the cases are frequently dismissed. Refer to case studies given in chapter 9.

The government needs not to pay any respect to customary or prescriptive rights or even other forms of property rights. Absolutely no case could be brought

[47] *State of Tamil Nadu v Sudalai Pothinadar [1998] 2 CTC 718*

against the government on account of infringing their rights over water. There could be several conflicts that are unknown and unreported, because local courts do not entertain when the case is made against the government.

In the final analysis, a plain reading of the relevant statutes such as the *Indian Easements Act 1882* and the two Tank Improvement Acts do not confer any such absolute powers to the government to take over the long held rights of *ryots.* It appears to be the case that the courts, actually interpreted or accepted such interpretations resulting in government control over the waters. Looking at the cases in a chronological order one could infer that the courts are no different from the bureaucracy that laid these laws in the first place. The courts were very consistent in making the (case) laws in support of the government interventions and eliminated many of the pre existing rights.

Understanding about the technology

In this section, an attempt is made to show how far the courts go to understand the rationale and logic behind these tank systems in their analysis before they arrive at a judgement. I find that rarely do the courts take such an approach but raise only legal principles or doctrines that are devoid of the context in which the issue is brought before the court.

Sequencing of flows to tanks

In a case involving seven tanks located in a Meyanur chain of tanks[48] in Pudhukkottai district, a conflict arose when the government started building an *anicut* on the stream shared by all. The project aimed to divert and regulate water flow to the tanks but it proposed an arrangement that affected a large tank located second in the chain. The local tank farmers feared the new arrangement would reduce their share of water and hence argued in the District Court that their customary rights would be affected by a change in arrangement. Though the

[48] *C. Arulsamy and S. Ubagaram v State of Tamil Nadu, [2003] 4 CTC 670*

district court did not stay the *anicut* project, considering the government had to do such 'development works', it offered a relief to satisfy the petitioners. The relief was that the sequential flows should be on the same lines as existed before. However, the new beneficiary tanks and the government appealed to the High Court and claimed the government held powers to alter everything related to a tank including the *anicut* and the diversion arrangement. The finer aspects of the technology and the keeping of the sequencing in water flows that were considered by the lower court was set aside by the High Court purely based on this point of law.

Temporary dams and permanent *anicuts*

A conflict arose between the beneficiaries of the lower and upper tanks fed by Gundar[49] river when a masonry bed dam (similar to *anicut* but built at very low height) was built to divert water to the upper tank. The pre-existing arrangement was a temporary mud dam laid in every season that would be dismantled by the lower tank users once water filled the upper one. When a masonry bed dam was constructed at this site the lower tank objected to it. The farmers were concerned about the flows below the crest level of the bed dam that will flow into the upper tank forever. But its case failed in the High Court which simply ruled such suits challenging government projects are not maintainable based on the previous case law.

The technological issue involved in this case is about the *receding flows* that arrive after the peak flows in a river. Such flows at the end of monsoons are usually very small, and run for several weeks in streams. This dispute occurred in the tail end of Gundar river. The river being not very far from the sea at this place, receives small quantities of thin flows in the receding monsoon. Since the masonry bed dams are permanent walls, they divert thin flows perpetually. The lower down tanks loose the option of using these flows forever if it is allowed. The river in this

[49] *Ponnusamy v The State of Tamil Nadu [2005] 4 MLJ 122*

particular place was very wide and ran for a long distance before it reached the diversion point[50]. Hence most of the water reaching this point as thin flows are diverted by the bed dam which gives an undue advantage to the upper tank. However there is no way the court would know this because it only considered the rights of the government to do such development work and nothing beyond.

In summary, as far as the customs, practices, usage and customary rights are concerned the courts played a definite role in undermining them even though laws like the Law of Easements and the BSO gave some protection to them. Chronologically, the case laws reveal a certain pattern. They went on decimating the customs, customary rights, customary practices and prescriptive rights held by tank users stage by stage and ending up at a point wherein anything done by the government has to be approved. This left the *ryots* without any option to proceed further in Courts. Today, if we see conflicts in every district between new government projects and the old ones, it is a consequence of these outcomes in the Courts. The extent of damages it brought to the performance of the old tanks is a matter for serious investigation. The following chapter on Vaigai shows how this case law and government policy has resulted in over 200,000 acres of historically tank irrigated areas in lower Vaigai being negatively affected.

6.5 Appreciation for Science and Sustainable Development

The discussion in this section is to show how understanding of the concepts of sustainable development, environmental conservation, ecological preservation, and the precautionary principle, though accepted as valid, is applied by Indian courts to tank systems. I argue here that they are least informed, and as disrespectful as that of their understanding of customs that I discussed in the previous section.

[50] I made a visit in September 2011 to see the site of the dam.

6.6 Positing Environment against Development

The relevance of sustainable development and trusteeship is highlighted after a few important rulings of the Supreme Court. These include disputes involving rivers (In *M.C.Mehta v. Kamal Nath, [1997] 1 SCC 388)*, land (In *Vellore citizens' welfare forum v Union of India, [1996] 5 SCC 647* and *M.C.Mehta v Union of India, [2002] 4 SCC 356)* ; and seas (In *A.P.Pollution Control Board v M.V.Nayudu [2001] 2 SCC 62)*, forests (In *T.N.Godavarman Thirumulpad v Union of India, [2006] 1 SCC 1*.

Buckingham canal case law

An early case to demonstrate the linkage between the large scale dismantling of tanks, channels and canals in Madras region was about resurrecting Buckingham canal (or also called Cochrane canal). The canal was excavated in the early nineteenth century as a transport route running parallel to the eastern coast of south India for over 400 km linking many cities in the present day Andhra Pradesh and Tamil Nadu. It starts from Vijayawada and ends up in Marakkanam a small port south of Chennai. This navigation canal integrated many local streams, backwaters and artificial and natural river channels feeding hundreds of tanks. Within the present city of Chennai alone it linked three major river systems that connected over one thousand tanks.

The dispute commenced when the government embarked on building a train line called Mass and Rapid Transport System (MRTS) in the early 1980s. Part of the train line was aligned to run exactly on top of the canal on elevated pillars raised from the canal bed. Around 11 train stations came on the canal by filling part of the canal and the banks. It affected the city's dwellers both rich and the poor in different ways. In August 1996, a 'public interest litigation' petition was filed to stop the work that is believed to cause the massive floods on that year.

The petitioners claimed

(i) the train line prevents the canal draining flows from many tanks and thereby causes floods within the city, and may cause the same forever if it is allowed;

(ii) existing water law prevents such projects. The BSO mandates the government to preserve the margins of all canals and streams without any structures; and the coastal zone regulations do not allow any construction for about 100m from the canal bank.

(iii) the wetland ecosystem of the Pallikaranai tank and Adayar estuary benefitted from the canal and flows from several tanks above would be affected irreversibly

The government replied

(i) under the *Indian Railway Act 1989* they had powers to construct any railway structure on any water body – including river, tanks, streams etc; and they even have powers to change the course of a river and hence changes made in the canal cannot be questioned.

(ii) the floods are caused by the slums located on the banks, and not because of the project. The slums are being cleared bit by bit[51], once they are gone the flooding may not recur;

(iii) The project is done for the larger 'public interest' to provide transport for citizens. Hence the BSO and the coastal zone management mandates shall not apply to the project;

(iv) The tank wetland, and marsh lands linked by the canal *cannot be preserved anymore* because of rapid urbanisation.

The High Court accepted all these government arguments and dismissed the case after ten years of hearings. None of the technical questions about wetland

[51] Last of one such case is reported In *Bharath Rathna Dr.B.R.Ambedkar Educational society v Union Of India* in Madras High Court 19 June, 2002. Available at http://indiankanoon.org/doc/859777/ [Accessed 02 February 2013].

ecology, need for channels and tank preservations were answered. These questions raised in the case are related to:

- relationship between rising number of floods and dismantling of tanks;
- linkage between tanks and channels;
- linkage between tanks and ground water levels;
- falling ground water levels and rising salinity in wells;
- loss of habitats for birds;
- loss of ecology including flora and fauna due to the loss of tanks (and also from the largest marsh land in south India).

The issues raised were of great scientific and technological importance that connects rural and urban habitations, tank systems, wetland ecosystems, estuaries, coastal marsh lands, artificial canals and natural rivers in the whole geography. The petitioners said all these aspects are very much related and necessary to the sustainable development of an area. But the court failed to go into any of these. The court cited another of its ruling from a year before that the environmentalists are creating an unnecessary issue and ruled that there is a need for many such railway projects. It said, "Our main aim must be to rapidly industrialize, and protection of environment must be regarded *as only incidental to this main aim, and not itself the main aim* (emphasis added)**.**[52]"

Differentiating Natural and Artificial: inventing a legal figment

Similarly, in *Susetha v Government of Tamil Nadu*[53], residents from a formerly tank irrigated village near Chennai city went to the High Court to prevent dismantling of their village tank, marked as 'Tank poromboke' in records. The petitioner said that the village is close to the sea and these water bodies are helping them to maintain ground water in their wells and prevent saline

[52] *Coastal Action Network v Tamil Nadu Pollution Control Board , [2005] 1 LW 13*.

[53] *Susetha v Government of Tamil Nadu, W.P.No.35942 of 2006*

ingression. The court verified these claims through a scientific commission from the Anna University's Centre for Water Resources (CWR). The Centre reported these claims as valid and gave a report detailing the present disrepair of the tanks in general, and the need to safeguard them in coastal environments in the larger interests of the society. The court did not accept the suggestions and findings, but rather used some of the finding that tanks are 'not natural' water bodies. As we discussed in chapter 3, all tanks and many channels are human creations for the benefit of man and animals.

It presumed that only 'natural water bodies' constitute natural environment. With this understanding it used the Centre's finding of tanks being in poor shape out of context and agreed with the government to dismantle it and create a shopping complex in its place. It did not occur to the court that small repairs to preserve the tank (that was also suggested by the Commission) would have helped resurrect the tank as wanted by the villagers.

On appeal, the Supreme Court too agreed with the ruling and reiterated tanks 'are not natural' and shall not deserve equal treatment as natural lakes[54].

[54] *Susetha v Government of Tamil Nadu, [2006] AIR SC 2893.* [The Supreme Court used another of its judgement in a case related to a lake named Kolleru lake. This lake is located in a 'natural' depression. However receives flood releases from 22 irrigation canals that pass through many villages and tanks in the vicinity. Inside the bed there always existed wet cultivation using the same water. In every sense of the word the lake is not fully a natural creation and an element of human hand existed. However, with a very simplistic understanding of what is natural and artificial in water bodies the judges estimated the village tank in Susetha's village as something of lower value compared to the Kolleru lake. The court said,"Recently, in *T.N. Godavaraman Thirumulpad v Union of India [2006] 5 SCC 47*, this Court again highlighted the importance of preservation of natural lakes and in particular those which are protected under the Wild Life (Protection) Act, 1972. We may, however, notice that whereas natural water storage resources are not only required to be protected but also steps are required to be taken for restoring the same if it has fallen in disuse. *The same principle, in our opinion, cannot be applied in relation to artificial tanks* (emphasis added)".

Even though the petitioners cited the legal doctrines of 'State being a Trustee of the environment', the importance of sustainable development and intergenerational equity, India's signature to the *Ramsar*[55] *convention 1971* and few other related case laws about conservation of forests, rivers, lakes and tanks[56] as binding precedents, the court said it took a 'pragmatic approach' and agreed with the government decision to dismantle the tank to build a shopping complex. As if part of a comedy, it directed the government to maintain the rest of the four tanks in the same tank chain, in the same village in order to preserve the ecology and ground water levels! As we can see, there is little science and legal doctrines left. As we will see below, this judgement was used as a precedent and many tanks done away with in Tamil Nadu in the following years.

In a case about preventing the conversion of a defunct tank bed, *Susetha* the petitioner approached the High Court[57]. Her case was to question the reclassification of a tank bed and conversion of the same into a site for building tenements. These tenements were constructed for those evicted from the Buckingham canal discussed previously. The government argued the place was not a wetland but an 'assessed waste wetland' as found in the revenue assessments. There are 133 'types of wetland assessments (that includes irrigated

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[55] Article 1.1 of the International convention on wetlands of International Importance (1971) states, "Wetlands are areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". According to this definition all tanks and ponds are wetlands and the government of India has classified all tanks as manmade wetlands and they constitute most of all inland wetlands in India (Scott 1989).

[56] *Intellectuals Forum v State of Andhra Pradesh. [2006] 3 SCC 549*. In a dispute related to dismantling of two defunct tanks in the temple city of Thirupati the Supreme court held tanks are a "communal property and the State authorities are trustees to hold and manage such properties for the benefit of the community and they cannot be allowed to commit any act or omission which will infringe the right of the community and alienate the property to any other person or body."

[57] *Susetha v The Union of India, CDJ 2010 MHC 4613*

lands and tank beds under cultivations)' of which some bear this title as 'waste wetlands'. Such fancy classifications existed in settlement records and are a product of revenue authorities over the last two centuries to collect graded land revenue from every bit of land. This piece is originally a tank bed that was allowed to cultivate wet crops such as paddy and hence attained that nomenclature. The court appointed a scientific commission to verify the claims.

The commission found that the land in dispute as a large wetland water body but in a partial defunct condition. It reported the government had already filled the area up to a depth of 1.5 meters to make it a place to build around 3,000 tenements. Beyond verifying the simple facts about the disputed land being a wet land or not, the committee's report detailed that government actions are creating more floods, water scarcity, salinity and sea water ingression; and warned about the impending ecological disaster to the natural environment.

The Court in the end, considering the 'larger public interest' of rehabilitating the slum dwellers allowed the wetland to be dismantled. The judges found fault with the Committee of experts (comprising of two well known professors in Ecology and water resources, and a young civil servant) for 'over stretching' their mandate by answering beyond their questions and using ecology, environment and hydrological sciences and Tamil literature in support of saving wetlands. The judges noted, "We are pained to observe that the Expert Committee, which is expected to answer the specific references, has gone a step further, commenting on various aspects, which are not at all germane (Para 53)." The judges used an ordinary school dictionary to refute the scientific meaning given by the experts for the said 'marshy land' (para 55) that was named as an 'assigned waste wetland' in land revenue documents. As the Supreme Court did in her previous case[58], the High Court directed "the government to provide clean, healthy and protective atmosphere to the residents and also to ensure regular water supply to the residents, which would solve many a problem being faced by the residents"

[58] *Susetha v Government of Tamil Nadu, [2006] AIR SC 2893*

[of the petitioner]. All that claims to establish the doctrines about sustainable development, and preserving wetland ecology based on international covenants like Ramsar convention is not appreciated in the court. The courts in short behaved exactly in the same manner as they did in the past.

6.7 POWER OF CLASSIFYING AND CONVERTING TANKS

The BSO gives the power to the government to classify and reclassify any land. Hence, the tank beds owned by government in law can also be reclassified and transferred to any agency of the government for a very different purpose[59]. In this way, tanks are regularly transferred from Revenue Department to other departments to build many utilities. For example in the ancient city of Madurai, over the last fifty years, at least eight large irrigation tanks and *ayacuts* constituting over one third of city's present geography have been converted. Tanks were filled up and made into spaces for building bus stands, city municipal office buildings, state and central government offices, radio stations, colleges, housing colonies and court buildings for the district courts and even the High Court (Seenivasan and Kumar 2004).

In the recent years these actions have been challenged in courts to stop such arbitrary conversions. Using the powers under the BSO, a tank named Mundiyambakkam in Villupuram town was converted into a space for building a medical college and a hospital[60]. The supply and feeder channels connecting the upper and lower tanks were to be made to carry the effluents from the hospital into the tank. Structurally, the tank remained intact and in perfect operational condition. The government claimed in the larger 'public interest' such a decision to classify the tank into a site for building a medical college. The farmers in the

[59] BSO 23 (A) -Transfer of land from one department to another department. The order gives powers to the government reclassify and transfer from its present use into any other use.

[60] *K. Balamurugan v The State of Tamil Nadu, In the High Court of Madras. W.P.No.26314 of 2007*

lower tanks felt their channels would be lost through pollution and did not want any change; they contested the project in the High Court. They cited how conversion of another large tank in the same town previously into a bus station lead to the falling of ground water levels in their wells. The petitioners showed evidence of ground water levels argued that these actions were against the sustainable development case laws, and India's commitment to the Stockholm Convention (1972) and Ramsar Convention (1971). The court discussed about all these doctrines and precedents in length but did not find them to apply in this case. Strangely, it ruled the conversion of this water body and network of tank channels was

> fully justified and the same have been carried out in the larger public interest as a part of implementation of Sustainable Development policy without in any way encroaching upon the maintenance or disruption of ecological balance (para 51).

The level of understanding of such doctrines has reached such a new height in this case that the dismantling of a water body and its channels that is over one thousand years old has been asserted as amounted to sustainable development! It is obvious, how much the judges understood the concepts and science behind the farmers' arguments.

Precautionary Principles

As part of the sustainable development ideas, some petitioners also advanced the concept of 'precautionary principles' to refrain from damaging water resources. However the courts again did not consider them worthy. Farmers advanced these principles to save tanks in the same district in another town when a bus stand was proposed on a tank bed and the ruling was the same[61]. Though the court said it understood the problems it did not want to yield to their pleas. It appreciated that pollution might happen from the bus stand, and flooding will rise due to the obstructions, ground water will fall, and the sustainable development of the area

[61] *S.Venkatesan v Government of Tamil Nadu In the High Court of Madras W.P.No. 19388 of 2006 and; S.V.N.Venkatesan v Government of Tamil Nadu, 7243 of 2007*

will be affected. However, in the final analysis, it agreed with the powers of the government to convert any tank into a bus stand and merely directed the government to consider the claims of the farmers, and to prevent any misfortune that might arise from such conversion.

Similarly, in another case involving an *interstate* tank named Ousteri[62] (located in Puducherry and Tamil Nadu), the court took a similar view. It allowed a private institution to build a huge hospital and medical college in the foreshore of this tank. The petitioners alleged the proposed hospital would pollute such a big tank irrigating over ten villages and supplying water to the state capital city of Puducherry. They wanted the court to use the 'precautionary principle' and not allow the hospital and the college to be built on the edges of such an important tank. They said the huge amount of water that comes out of the campus directly would reach the tank even as per the proposals (made by the College) and might pollute water. However, the court allowed the hospital to be built and 'gave freedom for the petitioners' to come to courts *in the event of any real pollution*. It found the precautionary principle may not apply even though the tank serves as a drinking water source to the State capital.

In summary, the principles of sustainable development, though stated in certain situations, are seldom followed in Indian courts as worthy legal principles with respect to the tanks. In my view, based on these judgements the courts consider such principles are either irrelevant to India, or simply lack the understanding of what a tank is all about.

6.8 CONCLUSION

Starting from defining the river to defining the tank, we saw how hopelessly the courts attempted to accommodate the property law understanding into these technological systems that pre-existed these laws.

[62] *D.Saravanan v Union of India, In the High Court of Madras, W.P.No. 29434 of 2006*

The conflicts reflected in the Fischer's suit in Vaigai and Urlam case in Vamsaadara river showed us the consequences of the colonial land settlements that divided the hydrological units into different property regimes as *zamindari*, *ryotwari* etc. These conflicts were essentially between a *zamindari* (private) and *ryotwari (government)* that arise as the litigation over water and tax before the court. Other benchmark cases discussed here show the courts merely supported the government actions in curbing or curtailing water rights in some way. In these disputes before the courts, the courts seldom saw the tank as a system that would not survive such changes proposed through government actions. When they did so they are either half measures or inadequate to safeguard what is pre-existing.

Conflicts related to water are not simply about the interpretation of rights and a legal position at a given point of time held by contesting parties. It involves a certain context, technology arrangements, its users, and time and space in which the dispute arose and dealt. The control over waters by the government started from major rivers and expanded to control even the tiniest part of a tank – the sluice openings and contrivances. While the statutes or the BSO did not originally aim so, the courts when called to interpret tend to provide new meanings. No answers to why custom rules and practices should not be followed came out of these rulings. On the contrary to giving adequate legal space in law as Easements Act says, the customary rights and practices were viewed with increased contempt by the courts. This is true of the technology but the benefits of availing the tanks also (Upadyay 2003).

The simple knowledge that these tanks have existed in the same place for many centuries with known histories does not occur to the courts. The judges do not appreciate the need for using sustainable development principles in administering justice. Since the decline of tanks has been highly pronounced after the British rule, and huge setbacks were noticed in the last three decades, it is time to assess the role of law in a dispassionate manner.

7. A CENTURY OF CONFLICT IN TANK INTENSIVE VAIGAI BASIN

7.1 THE CONTEXT AND THE CONFLICTS

This chapter presents a case study of Vaigai basin that explores the role of law and technology in making and resolving conflicts for water in a traditionally tank intensive area. The law here refers to land, water and other laws (rules of operations for reservoirs and head works etc.). The technological interventions, introduced by the government over the last 100 years to expand irrigation in the basin include river control mechanisms, major and medium reservoirs, bureaucratic controls (through rules of operations) over river management and acquiring monopoly control over waters.

The structure of the case study is divided into eight parts providing:

(i) the hydrology and history of the basin,
(ii) irrigation development through trans-basin waters from Periyar,
(iii) changes of an ancient *anicut* and resolution of first major conflict,
(iv) formation of Vaigai reservoir and the many premises,
(v) modernization or re-altering the river, river channels and command areas,
(vi) analysis of rules of operations of reservoirs in controlling the river and the tank networks,
(vii) intense struggles in Lower Vaigai Region
(viii) Summary and conclusions drawn from the case study.

Methodologically the case study considers tanks as interconnected systems in a larger geography at a basin level and beyond. This is a departure from conventional understanding that tanks are small, and serving local geographies. When read in conjunction with the previous discussions of the development of water law, in chapter 5 and 6, this case study offers a holistic understanding of law, technology and water conflicts affecting tanks in a larger area. The study is based on the premise that the traditional tanks in Lower Vaigai Region (LVR) or

Vaigai below Peranai *anicut* are negatively affected because of these (law and technology) interventions in the river, and they in turn led to the present decay in LVR tanks and resulted in ongoing litigations.

The river in LVR directly feeds around 402 tanks through 96 river channels[1] taking off from both sides of the river. The combined storage capacities of all these tanks in lower Vaigai are estimated to be 12,000 MCft [339.80 Mcum] (CWR 2003, 46). The Vaigai system for centuries is known as a 'run of the river' system wherein temporary dams (*kondams)* are formed to divert water into the tanks from head to tail without ever stopping the river in full. When the river flow reaches the last tank i.e. Ramanathapuram big tank or Ramnad big tank it is presumed that all these 402 tanks beforehand have been filled by the river surpluses[2]. When the annual flow in Vaigai below Peranai *anicut* reaches 10,000 *Mcft* it is considered dependable. Dependability indicates the certainty of the LVR tanks getting filled from the river (Ratnavel 2002)[3]. **Table 7.1** provides a summary of the performance of Vaigai river below Peranai anicut from 1889 to 2001.

[1] Done through 259 tanks directly connected to the river, and in addition 143 tanks are connected through dedicated sluices of these 243 tanks. There are, unknown number of tanks linked further into Sarugani and Gundar basins.

[2] See Rule 29 of Vaigai reservoir rules (Chief Engineer 1984)

[3] S.M.Ratnavel, Retired as Officer on special duty that is equivalent to a chief engineer of the Tamil Nadu Public Works Department (PWD), assessed the various developments in Vaigai as someone worked in the region. His synthesis of the dependability is taken from the letter sent to the Water Resources Organisation- Public Works Department (WRO-PWD) (Shanmugham 2002, 2–3). His earlier estimates appeared in some of the departmental conference published by the IMTI (Ratnavel 1997). His contribution by way of giving away some of the proceedings of the PWD for this research are acknowledged.

Table 7.1. Dependability of the River in filling up tanks in Lower Vaigai (Sivagangai and Ramanathapuram[4])

Period	Dependability of river Vaigai to fill all lower Vaigai tanks
Before 1889 (Pre Periyar)	20 out of 28 years - 71.43 %
During 1908-34 - After Periyar reservoir	15 out of 26 years - 57.69 %
During 1934-54 - After Periyar reservoir	11 out of 20 years – 55.00 %
After Vaigai reservoir: 'modernization -1' (1959-75)	5 out of 16 years- 31.25 %
After 'modernisation-2' program (1986-2001)	5 out of 15 years – 33.33 %

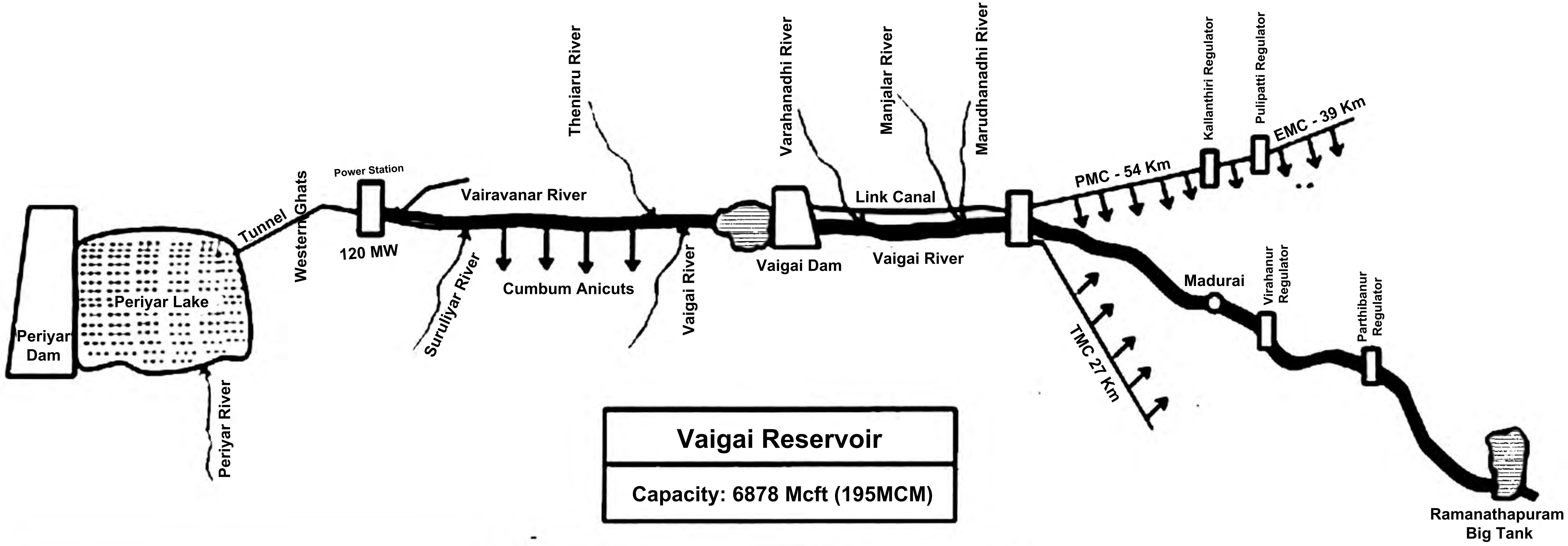
According to these assessments for a period of 28 years between 1860 and 1889 the river was 71.43 % dependable. The first major intervention in the basin was to bring the Periyar waters into Vaigai in 1889 to feed tanks in middle Vaigai. The changes following this intervention resulted in changing the hydraulics of Peranai *anicut* resulted in reducing the dependability to 56.52 % between 1908 and 1959. The interventions following thereon included the formation of a major reservoir and three medium reservoirs and modernization of river channels, canals and field channels that further reduced the dependability to 31.25 % between 1959 to 1975, and thereafter to 33.33 % in 2001.

While there are no definite studies based on actual measurements the assessments made by engineers worked in the region forms the basis for these dependability observations. These judgements are ultimately accepted by the government after long debates within the engineering and administrative bureaucracy, and acted upon by changing some of the rules in 2010, leading to

[4] In this research Ramnad is used as a region indicating both the present districts of Sivaganga and Ramanathapuram.

another set of court litigations. This reduced dependability resulted in series of regional protests and court litigation in which the government was accused of being unfair to the lower Vaigai tanks. This reduction in dependability coincided with rising protests about tanks showing the intensity of conflicts in the basin.

Figure 7.1 shows the schematic representation of Vaigai as today and Figure 7.2 shows the Vaigai River in a flow chart with many of its key installations as a ready reference in this discussion.



Vaigai Reservoir
Capacity: 6878 Mcft (195MCM)

Periyar Lake	
	15662 Mcft (443 MCM)
Capacity @ 136 Ft.	11210 Mcft (317 MCM)
Capacity @ 104 Ft. (Dead Storage)	5002 Mcft (177 MCM)

Length of Channel in Km								
Main Canal	=	PMC 58 Km	+	TMC 27 Km	+	EMC 39 Km	+	Total 124 Km
Branch Canal								220 Km
Distributory								1132 Km
Field Channels								> 10000 Km

PMC - Periyar Main Channel (53.8 Cumec)
TMC - Tirumangalam Main Channel (5.7 Cumec)

Not to scale

Fig. 7.1 Schematic Representation of Periyar - Vaigai Irrigation System

Source: Venkatasamy (2002)

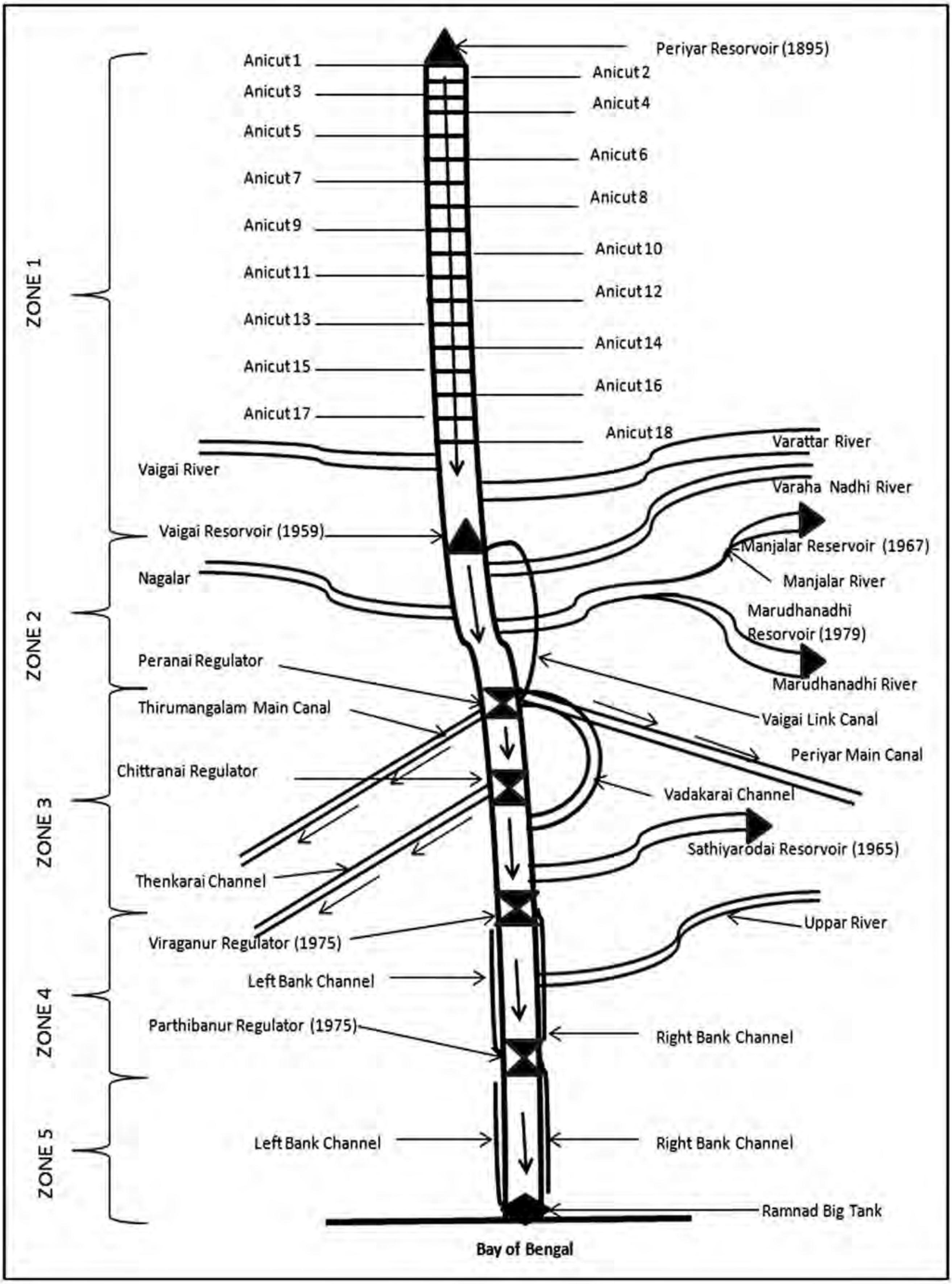


Fig 7.2 Vaigai River Flow Diagram

The reduced dependency is due to the reduced water flows beyond Peranai. The reduced flows beyond that point in the river are attributed to the appropriation of water in Periyar areas that used this *anicut* to pick up its waters. Since the construction of Periyar reservoir the irrigation was continuously increasing in Periyar areas, and strong doubts existed in the minds of the people in LVR about taking their water using such changes done to the *anicut* and administrative systems came with Periyar project. This case study while providing the basic description of various events that shaped for the last one century argues the modern interventions that have damaged the traditional system of tank networks in Vaigai.

Certainly, it is not my aim and purpose to argue that the Periyar reservoir scheme in itself is detrimental to the traditional LVR farmers. Rather the technology, political and water administration mechanisms including bureaucracy is central to the decline of the LVR. Hence, the discussion limits its discussions related to the political economy associated with the *ryotwari* and *zamindari* systems. As elaborated in chapters 4 to 6 the colonial government had different roles and responsibilities in irrigation development in different settlements and hence their actions varied. Though the political and revenue administration became uniform with the transfer of power in 1947, the past forms the basis for many government interventions till date.

7.2 PART I VAIGAI BASIN – ITS HYDROLOGY AND HISTORY

This section provides a technical and hydrological background for Vaigai basin in order to appreciate the role of tanks in a very large geographic area from the western mountains to eastern coast which is the hydrologic boundary of the basin. It shows that the pre-colonial (traditional) understanding of water development through tanks is based on a greater appreciation of the larger area going beyond the idealized villages or the immediate boundaries of small habitations or even pre-colonial boundaries of different kingdoms.

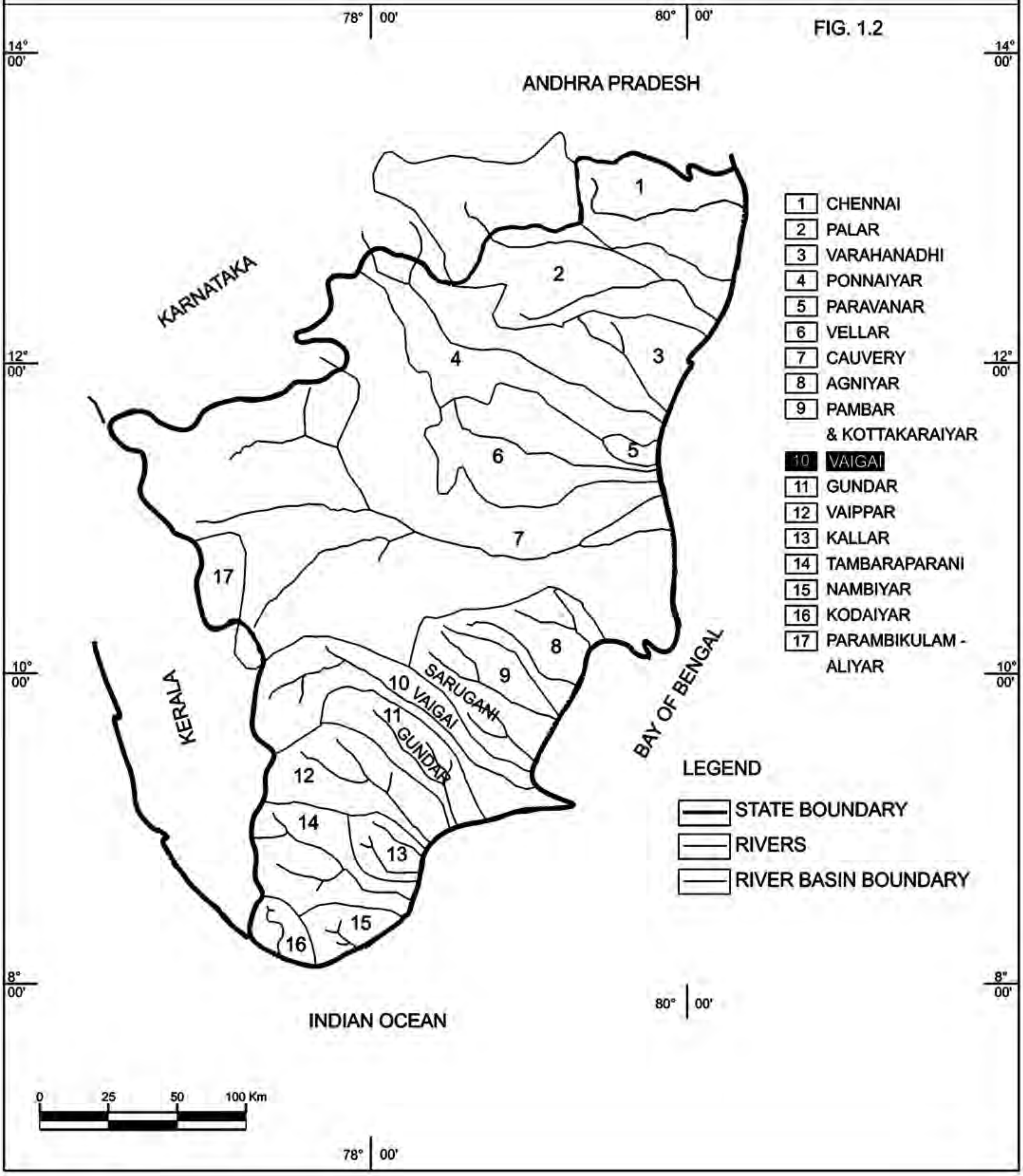
The basin

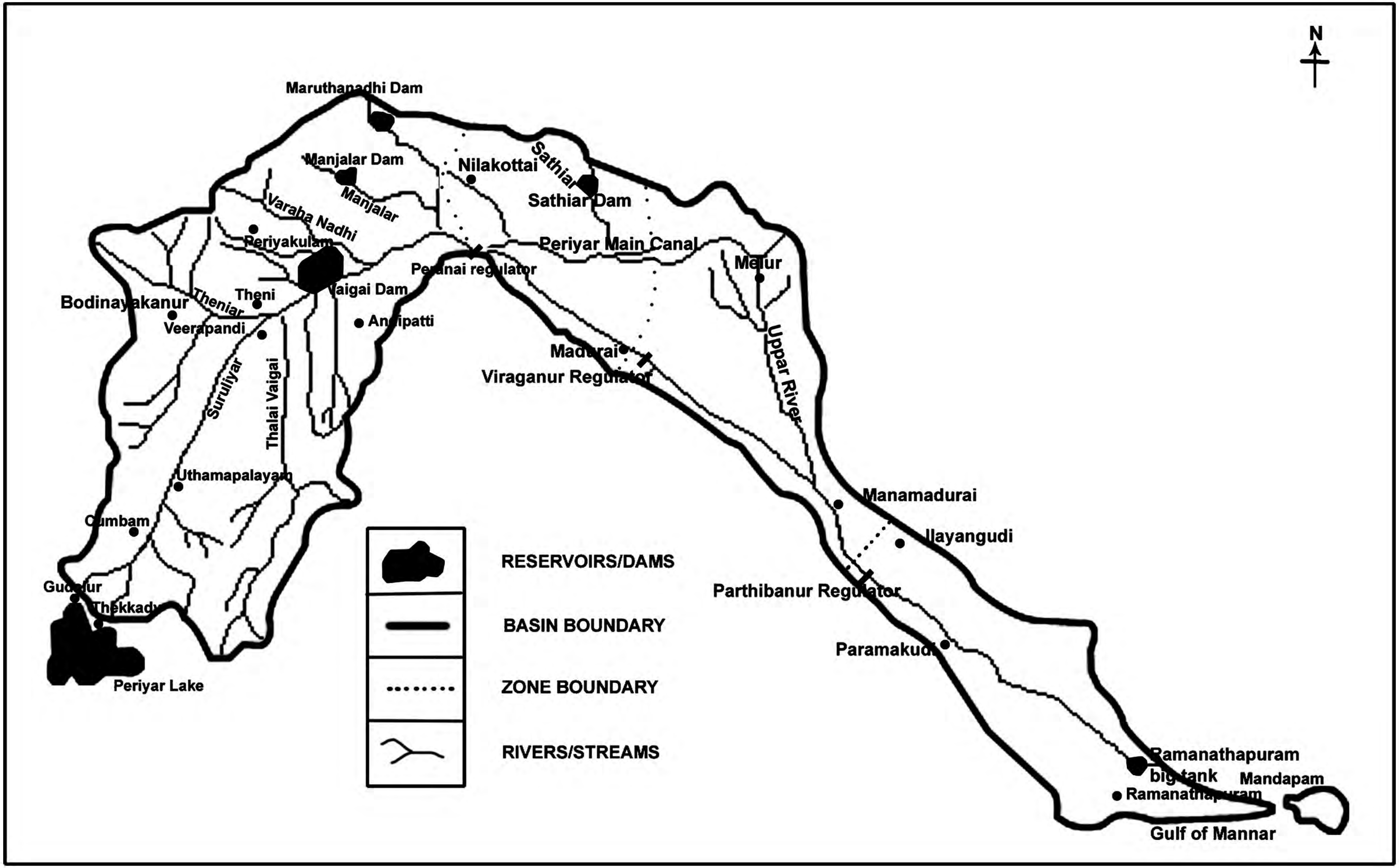
Vaigai basin lies between 9^0 15'- 10^0 20'N and 77^0 10'-79^0 15'E covering an area of 7039 sq.km in south central Tamil Nadu (Figure 7.3). The river originates in the southern parts of Western Ghats at an altitude of 1,524 m inside the present day boundaries of Tamil Nadu. The main river originates in the forests of Mayiladumparai in Andipatty Taluk and traverses 250 km from its origin to the sea. The width of the river basin varies from 6 to 50 km and the river is shallow with less than 4 m depth for most parts of its run.

The river basin is an arcuate shaped area stretching from the Western Ghats in the West to the Bay of Bengal in the East. The general gradient of the basin in its initial stretches up to Theni town is towards North East. Beyond this town, the river runs towards South East until it reaches the sea. Physiographically, the area is broadly divided into three units, namely the western mountainous terrain with valley complexes, the central elevated terrain and the eastern coastal plains. The three units present distinct characteristics in terms of its soil types, rainfall pattern, ground water availability, agriculture and sizes of habitations. Madurai, the major town lies in the middle of the basin on the banks of the river. Refer to Figure 7.4 to understand Vaigai river and its tributaries and Figure 7.5 for finding *zamindari* and *ryotwari* areas.

Fig.7.3 River Basins of Tamil Nadu

Source: State Frame Work Water Resources Plan, Institute for Water Studies (2003)

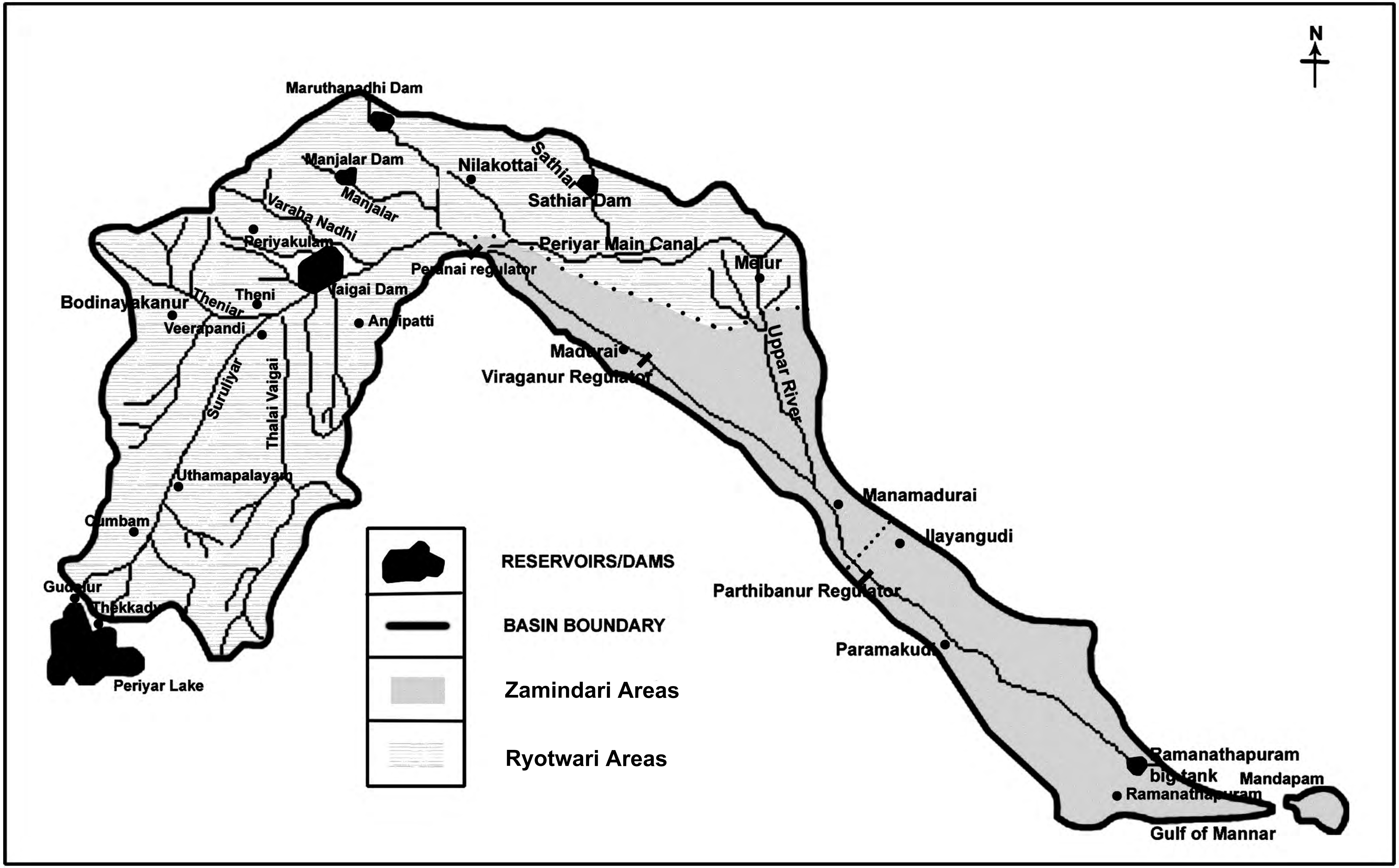




Not to scale

Fig. 7.4 Vaigai River and its Tributaries

Source: State Frame Work Water Resources Plan, Institute for Water Studies (2003)



Not to scale

Fig. 7.5 Vaigai Basin - Ryotwari (Government) Areas and Zamindari Areas

Another classification of three divisions is upper, middle and lower with regards to their geographical position along the river. The upper Vaigai basin is understood as the area from the western boundary to the Vaigai reservoir, constituting 35 % of the basin area and comprising hills and forests with narrow valleys that were very well-fed with smaller tributaries. The narrow valleys and the smaller plains have a series of tanks that are fed from the river. The middle Vaigai basin, from the Vaigai reservoir to Peranai regulator, constitutes 18 % of the area and comprises valleys, though the tributaries carry very little water. These are dry lands with very few tanks and are considered generally water-starved. The lower Vaigai constitutes 47 % of the basin area and comprise vast plains with numerous tanks fed from the river (Krishnamoorthy 2004).

The Water Resources Organization – Public Works Department (WRO-PWD), has divided the basin into ten sub basins for irrigation related purposes, named after the tributaries as Suruliyar, Theniar, Varattar, Nagalar, Varahanadhi, Manjalar, Marudhanadhi, Sirumalayar, Sathiar, and Uppar[5] (Figure 7.4). All of them together currently have 49 *anicuts, and* 120 open off-takes *to* feed several chains of tanks linked to the river. Peranai *anicut* is the biggest of all *anicuts* diverting water from rivers into tanks. After a run of 230 km from its origin, the river's stream divides into two; the bigger one enters a large tank called Ramanathapuram tank or *Ramnad* big tank. The surplus from this tank thereafter reaches the sea. The smaller stream of the river nevertheless reaches the sea directly but hardly carries any flows into the sea and hence many locals and experts consider the river as one that never goes to the sea (Krishnamoorthy 2004). The river runs both in *zamindaris* and the *ryotwaris*. Below Peranai, the river runs and belongs to Sivagangai and Ramanathapuram districts that were formerly *zamindaris*.

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[5] Certain previous documents of the same department provide a list of ten sub basins and it appears the present classification of six basins is used in recent projects (Institute of Water Studies, 1985). A certain amount of discrepancy in data needs to be tolerated in this discussion because of the absence of any single database for researchers to rely upon.

Interbasin transfers

The geography of the basin plays an important role in the availability and usage of the river water. Until the completion of major and medium reservoirs[6], water from the river and tributaries were solely stored in the tanks. All major and medium reservoirs are relatively new creations that were built in the last century. Historically, the river Vaigai was linked to the adjoining two basins named *Saruganiyar*[7] and *Gundar.* (WAPCOS,New Delhi 1995). These two river basins are characteristic of the chronically-drought affected and water starved areas within the State. Out of total 17 river basins in Tamil Nadu, only three basins do not have a reservoir built in the last two centuries. This include Gundar and Saruganiyar. These two basins are tank intensive, mostly *zamindaris*, and presently brought under the Drought Prone Area Programmes[8] (DPAP). Gundar basin has 2,276 tanks and its major tributaries such as Kiruthumal are linked directly with the river Vaigai to draw waters into them (DHAN Foundation 2002a). Sarugani basin has 2,041 tanks and also has channels to draw water from Vaigai into them (Mosse 2003, 43). Put together, these three basins - Vaigai, Gundar, and Saruganiyar - do not have any flows left to reach the sea (Government of Tamil Nadu 2003). The

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[6] Reservoirs are classified based on irrigated areas as small (<1,000 ha), medium (1,000 to 5,000 ha) and large (> 5,000 ha), by the Government of India.

[7] *Saruganiyar*, though an independent basin on its own right, is small in size. After the Water Resources consolidation project (WRCP) for the purposes of basin administration and classification, it is combined with Arniyar & Kottakaraiyar basins and numbered as 9. Vaigai is numbered as 10 and Gundar as 11 (Government of Tamil Nadu 2003).

[8] Drought Prone Areas are defined based on rainfall inadequacy and consequent droughts in a given area. The Drought-Prone Areas Programmes (DPAP) commenced in 1973, and aims at minimizing the effects of drought through an 'integrated development of the area'. This integrated development may include irrigation projects including tank repairs or drilling wells, land development programmes, afforestation, grass-land development, rural electrification and even road laying, offering credit and so on. Within the basin, the lower Vaigai areas covering Sivagangai and Ramanathapuram districts are declared as DPA and offered special assistance every year mostly for tank repairs and rarely for other activities.

river Vaigai has to be understood as a river belonging to three basins. The *inter-basin* water transfers are a historic phenomenon and not of any recent origin. Nelson (1868)'s Mathura manual and Francis ((1906)'s Madura gazetteer considers the development of Vaigai as important source of water for the adjoining two basins.

The river effected inter-basin water transfers at specified places through *anicuts* and earmarked channels. The transfers have customary rules and hence have been treated as legally settled for a long time. Some important examples of inter-basin transfers are

(i) *Thenkarai,* a southern channel feeding tanks including Madakulam tank near Madurai town, that lies in Gundar basin;
(ii) *Nattarkal,* a northern channel starting from near Paramakudi feeding the Rajasingamangalam tank in Saruganiyar basin;
(iii) *Konthagai channel, a* southern channel feeding several tanks in Gundar basin in Ramanathapuram district (Ratnavel and Gomathinayagam 2006);
(iv) Many special schemes implemented in the last century to feed hundreds of tanks that lie in Gundar, such as the Nilaiyur extension and the Thirumangalam canal extension (WAPCOS,New Delhi 1995).

Ratnavel and Anandkumar estimated that at the height of Vaigai's glory around 200 Mcum would have been transferred to Gundar basin. But this has fallen down to a maximum of 132 MCum in 2002 (Ratnavel and Anandkumar 2002).

Tanks in the basin: A pre-colonial perspective

This section provides a pre-colonial understanding of tanks as noticed by the British officials and others who visited the area. It shows an intricate technological understanding required to create and sustain tanks.

In general, all tanks are manmade and agricultural life revolves around the successes of such artificial water systems in these semi-arid areas. Human interactions with their natural settings created different sources of water. Of these, tanks stand out as the single most important structures in this basin. Nelson (1868), in his Mathura manual observed,

> There are no natural lakes or pools in any part of Madurai District. Wherever water may be seen, it is quite sure to be water that has been stored up artificially: and if he go[es] from the Palanis [part of Western Ghats] to the sea coast, a traveller will never come across a natural reservoir of even the very smallest size (Nelson 1868, 20 part I).

Consequent to the development of water sources, the villages, and its occupants changed. Colonial reports of the eighteenth and nineteenth century describe how there were not only people of different castes but also different languages coexisting in the Vaigai basin and using the same river (Nelson 1868, 148 of Part I). The many different types of villages and communities had the tank as a common denominator that linked with the river and other tanks in the area.

Tank as water technology

Nelson (1868) offered a global view of tanks across the Vaigai basin in simple terms:

> The native rulers of the country early discovered the fact, that east of the mountains the District slopes down constantly towards the sea with an average fall of about ten feet per mile; and they took advantage of this lay of the land to establish & most effectual, through simple system of irrigation. Wherever the surface dipped a little on either side of the Veigei [Vaigai], a strong curved embankment was run up to the height of a few feet with its concave side facing the river; and a channel was taken off at a spot nearly as high above the level of the sea as the top of the embankment. By means of this channel, water was made to run in flood time to the low-lying land, and the tank or reservoir was complete. Flowing against the embankment the water rose to the required height, and became available for irrigation by means of sluices and channels. To prevent the embankments of large tanks being breached by hoary waves dashing against them in windy weather, their inner sides were faced with stone-work. Surplus water was carried off by waste channels placed at proper level: and was sometimes made to supply series of smaller tanks, constructed on lower levels, in the following manner. As soon as the parent tank had received a certain amount of water, and was nearly filled,

> the incoming flood was carried away through outlets and by means of waste channels into a subordinate tank. This was rilled in the course of time: and its surplus waters were carried off by waste channels to tank No.3. This was made in like manner to supply No. 4; and so on, until the lowest of all was supplied, or until the waters failed. The surplus waters, if any, of the last tank, were usually emptied into some river, and afterwards made available for irrigation on lower lands (Nelson 1868, 19 part I).

This is an impressionistic summary by an administrator about the many technical features. The general gradient of the basin and the nearby basins are known and used by the inhabitants. The habitations are planned in the manner to accommodate tanks in their midst and link it appropriately; every local mound and depression was used to ideally locate the tank, and establish local linkages (channels) between them; bed levels and flood levels of the rivers were known in order to locate *anicuts* in rivers and weirs in tank in appropriate levels. The levels of specific tank structures were fixed in sync with rivers and channels that originate in faraway places. The artificial channels were designed to merge with trained rivers and streams to drain floods without damaging the habitations and agricultural fields. The water technology in real sense goes beyond understanding the tank as an artefact, or even as a storage system, but as a visualization of the entire basin starting from the hills to the coast[9].

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[9] Some aspects about the unconventional engineering and technological aspects of design of channels and tanks in Vaigai region is discussed in (Ratnavel and Gomathinayagam 2006). Two examples are cited from the book: (i) The *Nattarkal* channel (that feeds Rajasingamangalam tank in Saruganiyar basin) is much wider than the river itself. There is no permanent *anicut un*till the nineteen eighties to divert the river into the channel. This unconventional design, lay of the channel and location of the diversion is solely aimed to divert any amount of flood flows of Vaigai into another basin through a manmade channel. (ii) A large tank named as Ramnad big tank is found in the very end of the river. This tank is expected to store surpluses left in the river after the diversions in *Nattarkal*. In modern irrigation engineering large storages are mostly established in the head reaches of a river. No example of huge storages created as close to the sea meant for irrigation. Unfortunately, the technology aspects of tanks, channels and trained rivers are seldom explored. Not a single technical study exists to understand the phenomena of forming tank networks.

The count on the total number of tanks exists within Vaigai basin varies considerably in the available reports. Nelson based on 1861 details, reported[10], "there were around 5,688 tanks; of which many were fed by 508 river channels, 27 spring channels and 376 *anicuts* (Nelson 1868, 142–143)". These details include tanks in Gundar and other adjoining basins. Krishnamoorthy (2004) estimated a total of 2,222 in all with 1,494 tanks were maintained by the PWD and 728 by the Panchayats. A break down is provided here as per the zones in **Table 7.2** for the PWD maintained tanks.

Table 7.2. Tanks in Vaigai basin

Sl. No.	Tributary	*Anicuts*	Channels	Tanks
	Zone 1: Periyar dam to Vaigai dam			135
1	Suruliyar	15	20	
2	Vaigai	3	3	
3	Varahanathi	4	5	
	Zone 2: Vaigai dam to Peranai regulator			86
4	Manjalar	9	9	
5	Marudhanathi	5	7	
	Zone 3: Peranai to Virahanur regulator			257
6	Sathiar Odai	5	8	
7	Uppar	7		
	Zone 4: Virahanur to Parthibanur regulator	0	38	710
	Zone 5: Parthibanur to Ramanathapuram Big Tank	0	58	306
	Total	48	148	1494

(Krishnamoorthy 2004)

[10] The data of Nelson include parts of Vaigai and Gundar basins that formed most of Madurai district at that time.

Another report of the government suggests there are 521 system tanks and 976 non-system tanks (Institute of Water studies 1988). System tanks are those connected to the river Vaigai or a canal. Non system tanks are not entitled to receive water from any assured source. However, they may be connected with other tanks and sometimes to system tanks if they are in the vicinity. Ratnavel estimates there could be around 3,000 tanks in the three basins of Vaigai, Gundar and Saruganiyar somehow connected to Vaigai river (Ratnavel 2002). Of this, the biggest beneficiaries of river Vaigai are in the lower Vaigai region.

Irrigation before 1895, was mainly concentrated in three different segments as follows: Cumbum valley in the upper reaches 12,000 ac (7 %); All six tributaries in middle reaches 17,000 ac (10 %); Lower reaches 141,000 acres (83 %)[11] (Krishnamoorthy 2004).

Tank and agriculture

Nelson (1868) also provided some understanding of how local forests, created in the tank foreshores to supply fuel, timber and different types of agriculture, thrived across the basin. He listed 29 popular varieties of paddy cultivated in tankfed areas within the basin. The choices were based on many factors including the rainfall, water availability, season and human preferences such as taste. Many varieties of paddy were very specific to this region, which differed from other rice-cultivating areas like tank-intensive Chinglepet and canal-irrigated Thanjavur. Paddy is cultivated at most times of the year, in all types of soils wherever water is made available from tanks, with a crop duration ranging from 90 to 210 days area. The kinds of rice that could be grown varied according to the availability of water and the season: when the water was available for a long time, finer grain rice requiring longer growth times were preferred; when water was in short supply, coarse grain rice were grown. This diversity also depended on the

[11] The area in Lower reaches are contested even during the colonial times. Some engineers' reports of *zamindari* areas site this area as 200,000 ac. This issue is discussed in the future sections.

performance (dependability) of the tank, monsoon setting, time of the year and the storage size of the tanks. The crop practices were diverse depending on the land, water availability, its nutrient status and other connected inputs drawn from tanks. In general the LVR like the Ramanathapuram and Sivagangai, cultivate mostly the coarse varieties of paddy that is well suited to the low water availability and risks while the upper reaches prefer finer varieties.

The removal of nutrient-rich silt from the tank bed and channels were recycled into agricultural uses as a matter of routine and was central to the cultivation in drylands that are not watered by tanks (Zacharias 1950). Though some remnants of these practices are visible today, many of the finer aspects of understanding the tanks as a whole, and thus agriculture, no longer exists. Only a handful of paddy varieties thrive and silt is not used as extensively as done in nineteenth century.

Nelson differentiated between the farming undertaken in his native England and in Vaigai region and wrote about the many distinct uses of tanks in agriculture:

> The practice of diluting manure with large quantities of water seems to be known to the *ryot*s, and various modes of making, altering and correcting soils are well understood. Again this practice linked all lands with tanks in a given village or a location. The fluviatile deposits [silt] found in the beds of channels and beds of tanks are largely made use of. The principle of using different crops in rotation is also understood (Nelson 1868, 102 part I).

Tanks, even if they are not meant as an irrigation source in dry land areas, remained important to provide many uses beyond irrigation. Therefore, the linkage between the tank and agriculture in general, and rice cultivation in particular demonstrate that the tank as a technology goes beyond an understanding of water alone.

Extent of tank irrigation

The scale of tank development today in the Vaigai basin is not only extensive but also intensive. They are extensive in the sense that they are found in all parts of the basin wherever water sources are available and intensive in that wherever they are, water use has been maximized to produce more through combinations of agricultural technologies and crop varieties. In the whole basin, the plains are located at the very end of the basin: it is wider and so there are more tanks and more irrigation. Frederic Cotton, brother and contemporary of Arthur, also a votary of using rivers to fill tanks suggested Vaigai could be a model for water development in other parts of the country[12]: "The mode of storing water was most effective and most economical, and an absolute proof of what could be done now – an example we should be shamed not to follow, with our greater power and greater knowledge" (Cotton 1901, 10). He also felt that Vaigai demonstrated "exactly the principle on which the great rivers should be treated as far as the possible" (1901, 28). Cotton's appreciation leads us to add further elements to the water technology debates about the kinds of storage needed in a certain context, how an entire river has to be utilized and how water technology programmes to be evaluated for its usefulness[13].

Inter-basin transfers arise out of surplus in certain areas and deficit in others. Such transfers require breaking the natural basin boundaries by way of forming artificial channels to link them. The extent of such a practice was observed in this basin by an early eighteenth century European visitor, Father Martin, a missionary in 1713. He wrote about this phenomenon in Vaigai:

[12] Arthur Cotton has proposed ideas for promoting Australian irrigation in the first half of nineteenth century probably based on his understanding of Vaigai. He suggested the natural gradients available in the Darling basin (similar to Vaigai with 1 foot per mile) shall be used to develop tanks and networks of channels. He even believed the entire basin could be populated with villages when such an 'Indian' model is considered for developing irrigation (Cotton 1900, 46–49).

[13] These attempts to link tanks with assured supplies in Vaigai basin seem to be differing from other colonial and post colonial efforts in irrigation development. Paranjape et.al found large irrigation projects did not attempt to link the tanks with the modern projects (Paranjape et al. 2010, 93–94).

> Nowhere have more precautions been taken than in *Marava* not to let a drop of water escape and to collect all the water formed by the rains in brooks and torrents. Here, there is to be seen a pretty large river called Vaigaiyaru. After crossing a part of Madura, it enters *Marava*, and when its bed is full, which ordinarily happens a whole month every year, it is as large as Seine[of France]. Yet by means of canals dug by our Indians far away from their tanks, this river is so drained on all sides that it does losses itself entirely and does not reach its month till it has spent several weeks in filling the reservoirs towards which it is diverted. cited in (Raghavaiyangar 1898, 6–7).

The reference to Marava refers to the three basin areas of Vaigai, Gundar and Saruganiyar rivers. The reasons for sourcing and moving water within and outside the basin varied from place to place. In some places, it was to alleviate floods (in over-surplus areas) and in others to relieve the water deficit. Nelson's Madura manual and Francis's the district gazetteer cite many reasons for sourcing water as a way of developing tank irrigation in these three basins – Gundar, Sarugani and Vaigai. Sourcing and conducting of water for tanks from local and faraway places had been a constant feature of this region (Mosse 2003).

Tanks, River and the Certainty of Water

An attempt is made in this section, to show how tanks in Vaigai are designed to tackle the hydrologic and hydraulic risks of the highly varying nature of the basin characteristics. There are four types of risks associated with water systems especially irrigation systems hydrological, hydraulic, structural and economic. Hydrological risks arise from the inherent randomness of the natural hydrologic process, especially the total amount of rainfall and intensity. Hydraulic uncertainty arises from the poor hydraulic conditions such as reduced channel widths, encroachments, silted up channels, etc. Structural risks arise from structures such as weak bunds, broken masonry works of the sluices, weirs etc. Economic uncertainties arise from poor finances made available to maintain these structures (Government of Tamil Nadu 2003).

Hydrologic uncertainty

There are no unfailing sources, such as glaciers, in the entire south Indian region. In particular, the source of all the water in Vaigai basin is the rainfall that occurs within the basin boundaries. Therefore, any uncertainty and fluctuation in rainfall result in a deficit of water. Francis (1906), summarized the nineteenth century rainfall patterns and the water requirements as inadequate to fill the tanks in Madurai. In the *ryotwari* areas of Madurai district, "the average number of wet days in a year is 53, so that the average fall per rainy day works out to 0.64 inch, which, though quite a good shower, is considerably less than is necessary to fill tanks...(1906, 1:161)".

Further, the variations in rainfall within the basin, i.e. between the western parts bordering the Ghats and the eastern valley touching the coast, are also very high. The hundred years' average of the rainfall in western part near Thekkady (in Western Ghats) was 1814 mm while the middle part near Edayapatty received 644 mm. The average for the basin on the whole is 882 mm (Government of Tamil Nadu 2003). This shows the high variability between two areas in the basin. In short, the western parts receive a higher rainfall and alleviates the uncertainty in the eastern part through the river.

Rainfall is a cyclical phenomena and fluctuation occurs within a year and also over the years. Nelson (1868) wrote about the undependable behaviour of Vaigai due to erratic nature of rainfall:

> [Vaigai is] so irregular, indeed, are its periodical fillings, that they can never be predicted with any certainty, or relied upon with any safety. When it rains Madura [central part of the basin], there will very possibly be no rain in the mountains [Western Ghats]: and consequently no freshes in the river. And when Madura is suffering from drought, there may be torrents of rain, in Cumbum and Varshanad [in the Western Ghats] (Nelson 1868, 17 part I).

Therefore, the river acts as a source of water to the densely populated eastern areas or the LVR. Rainfall patterns do not change overnight and hence this must have been a historic phenomenon. A study by economists from the MIDS using daily rainfall records in all parts of the basin for the period 1947-1997 from 29 rain gauge stations found that:

> In the Vaigai basin it appears that in all stations (except Manalur tea estate, Kodaikanal, and Thallakulam) CV [coefficient of variation[14]] is more than 30 % during both monsoon periods (South West and North East). And CV is even more than 50 % for several stations during south West monsoon period[15]. Thus as per the Indian Metrological department's definition[16], rainfall is found to be quite erratic in both north-east and south-west monsoon periods during the past 40-50 years (Janakarajan and Vaidyanathan 1997, 28).

The higher the coefficient of variation in rainfall, the higher is the need to store water. Hence the need for a large number of decentralised storage systems like the tanks. Thus many tanks would have come into existence over the long history.

Of the entire basin area, the eastern part[17] lying in the LVR has the highest variation in rainfall and is always erratic. This area again has around 80 % of the number of tanks benefitted by the river Vaigai. The ground water in the eastern parts of the basin area is very limited, mostly saline and not fit for drinking. The ponds called *Oorani* in every village in this part also need to depend on the tanks for their water. Most such domestic water ponds are filled from the local tanks directly or indirectly from the tanks (DHAN Foundation 2001; 2002a).

Furthermore, Vaigai basin does not show any spatially coherent significant correlation between the wet season parameters, such as starting date, ending

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[14] The coefficient of variation (CV) represents the ratio of the standard deviation to the mean. It is a useful statistic for comparing the degree of variation from the mean rainfall. Higher the CV the rainfall variations are higher resulting in higher hydrologic risks and hydraulic risks.

[15] There are two agricultural seasons in this area in a year during South West (SW) monsoon, and North East (NE) monsoon, and in both the seasons the rainfall is erratic. Normally the South West monsoon is used for dry land crops and the North East monsoon for irrigated crops and considered contributing monsoon for the tank storages.

[16] Indian Metrology Department defines 'erratic' rainfall when the co-efficient of Variation in a season goes beyond 30 %.

[17] Indian government has even declared this area comprising Sivagangai and Ramanathapuram districts as a Drought Prone Area (DPA).

date and duration, unlike the basins of north India such as Ganga and Brahmaputra where these parameters are uniform. When compared to them, Vaigai has 45.3 % probability of post monsoon rainfall[18], one of the highest in India[19]. It means that there are high chances (45.3 %) of rainfall occurring after the regular rainy season and could also serve wet crops. This could be another reason for having more tanks in this basin, which makes wet crops like paddy possible in a dry area. Decentralized *but* interconnected storage systems like the tanks used the river and channel networks to alleviate both these risks that may not be possible in a smaller geographical area. This leads us to believe the reason for such a vast and wide development `

Need for water

There are stark differences in the descriptions of Vaigai river in Tamil poetry dating between the second and the 12th century A.D. Tamil poetry during this period classifies the entire Tamil Nadu region into five ecosystems, which is little researched from the perspective of understanding water systems as found in this body of literature. Nevertheless some inferences can be drawn.

Tamil scholars believed rivers are "a source that did not even fail when the rains failed (Thani Nayagam 1966, 21)". Rivers were often attached to the glory of Tamil kingdoms. In that way, river *Periyar* belonged to the *Chera* Kingdom, the *Vaigai* to the *Pandiya* Kingdom, and the *Cauvery* to the *Chola* Kingdom. The *Chera* country in the west was known as the land of River Periyar[20]' and Pandiya country in the east of Western Ghats as the fertile lands benefitted by Vaigai[21] and the

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[18] Surplus in one season is used for the next season, surplus in one place is used where it is deficient.

[19] (Ranade et al. 2008) analyzed the rainfall variations in India in all major basins including Vaigai.

[20] Pathitrupattu, 28,10-11 (Periyatruc Cirutai viyanpulam) (Sarangapani 1984)

[21] Purananuru, 71:10 (Mali pukal Vaiayai culnta valankelu vaippu).ibid.

Chola country in the north as the land of Cauvery[22]. The rulers are called with their river names: *Chola* king was called the leader of Cauvery[23] and the Pandiyas were called the southerners from Vaigai[24].

Poems in *Paripatal*, part of the Sangam poetry, depicts the areas surrounding the present day Madurai in Vaigai basin. This corpus is dated to be from the second century A.D. Major themes of these musical poems include taming the river by its citizens, filling up tanks with river water, and saving the bunds of rivers and tanks from breaches. *Paripatal* indicates that the river flowed wherever it liked by overcoming every barrier it faced[25] and flowed swiftly like the wind and appeared like an ocean[26]. Many poems describe about the copious floods in Vaigai and social rituals associated with closing the breaches of the rivers, channels and tanks. In the same way, *Chilappathikaram*, another Tamil epic, describes copious flows in Vaigai and the river is difficult even to cross with boats [27].

However, by 12th century A.D, the situation appeared to be very different. The river did not even reach the sea and became a source of derision. Poets from the rival kingdom of *Cholas* ridiculed the river as an 'emaciated damsel' who does not want to meet her lover, the sea. Sridhar *et al (2005)* cite Tamil poetry again and wrote,

> *Ottakkuthan*, a poet in the court of the Chola emperor Rajaraja–II mentions in his work Takkayagapparani that Vaigai does not join the sea. The learned commentator says that Vaigai is not a Samudragamini i.e. it does not join the sea, but joins the river Pamparu, which falls into the sea, and has dried up to a great extent. (Sridhar et al. 2005, 2).

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[22] Porunaraatruppadai, 248 (Kaviripurakkum natu).ibid

[23] Purananuru, 58:1; 399:12 ((Kavirikilavan).ibid

[24] Kalittokai, 98:30-31(Tennavan Vaiyai).ibid

[25] Paripatal, 7:16-20. (Sarangapani 1984)

[26] Paripatal, 12:7-8 ibid

[27] Cilappathikaram XIII. 174,175 (Sarangapani 1984)

In general, construction of tanks in Vaigai region is described in Tamil poems of *Purananuru* dated to the second century A.D. But poetry after 12th century A.D does not have references to building new tanks but only about tank repairs. Again, to confirm this, the hundreds of inscriptions that are dated to be inscribed after 10th century A.D in this region refer only to tank repairs, bund strengthening, weir modifications, channel extensions and building of improved weirs and sluices (Vedachalam 1986; Chandramurthi and Vedachalam 2002; Rajan 2008). It further shows that the river was fully utilized and there was hardly any surplus water left for any expansion of irrigation since 12th century.

The description by administrators in colonial times starkly differ from *Paripatal* that describes floods as annual routine. Many colonial reports describe the shortages in Vaigai with graphic details and the need for water in the region. Under British rule, Madurai was very peculiar in Madras presidency that it was faced with very few floods compared to any other region/jurisdiction. The Madura gazetteer reported, 'only a few floods have occurred in the district' in its known history. There were only five floods that passed through Vaigai in great fury and damaged the tanks during the last four centuries in 1677, 1709, 1814, 1843 and 1884 (Francis 1906, 1:161). Colonial reports and gazetteers describe nine famines in the nineteenth century during 1812-1814, 1832-22, 1836, 1866, 1876-78 (Francis 1906, 1:162–166) and invited the attention of various commissions including the Famine Commission and the Irrigation Commission to find alternatives (India. Irrigation Commission. and Scott-Moncrieff 1903).

In conclusion, historic Vaigai irrigation shall be summarized as follows:

i. the basin is notionally divided into lower and upper Vaigai by taking the Peranai as the middle point;
ii. during colonial times the upper Vaigai was mostly settled as *ryotwari* and the lower Vaigai as a *zamindari*;
iii. lower Vaigai is the main user of Vaigai river for tank irrigation;

iv. Irrigation before 1895, was done only from waters of Vaigai river stored in tanks; and the later additions were from the Periyar waters;

v. Most tanks, if not all, were existing for a long time and constructed well before the British came to India.

7.3 PART II IRRIGATION DEVELOPMENT: IN-BASIN AND TRANS-BASIN TRANSFERS AND COLONIAL POLICY

Irrigation interventions in the nineteenth century had several reasons and this section highlights some of the main motivations in the Madras presidency in general and Vaigai basin in particular.

The British completed the political takeover of most of Madras presidency including the Vaigai basin area from its native rulers by 1803, and then started elaborate land revenue settlements. The basin had four distinctive areas lying in Dindigul, Madura, Sivaganga and Ramnad with different histories, encounters with Colonial rulers and hence different land settlements. In most of Dindigul and Madurai situated in the upper and middle parts of the basin where the lands were settled as *ryotwari;* and in Sivaganga and Ramnad spread in the lower parts of the basin became *zamindari.* The period before the takeover by British lasted for more than 100 years of direct and indirect wars by them with the local rulers, and was followed by another fifty years of rebellions here and there. The rebellions had several reasons of which exorbitant land taxes were one of them (Gowri 1987). In 1803, the assessment of land revenue (land taxes) was fixed as 43.75 % of the produce (Nelson 1868). The rates fluctuated and though they came down over time they remained understandably very high for most of the nineteenth century. The government needed to respond to the high taxation by reciprocating through their involvement in irrigation development. Generally, irrigation was considered a source of revenue by charging the cultivators more when provided with water. This has been well experimented in repairing major irrigation projects such as Cauvery even before 1850 (Raju 1941, 122). Similarly, about the tanks, the statesmen of the time, Edmund Burke said

> This [Tank] is the National Bank of the Carnatic, of which it must have a perpetual credit, or it perishes irretrievably. For that reason, in the happier times of India, a number, almost incredible of reservoirs have been made in chosen places throughout the country (Cotton 1900, 61).

Burke argued at the policy level, to invest more in tanks to achieve high and assured returns. For example, in Madurai district an area of 10 % of the total cultivated area in the district was under tank irrigation but yielded one third of the total tax revenue for the government[28] (Nelson 1868, 142–143 of part V). Hence, the importance of improving the existing tanks, bringing additional waters into the existing tank became highly beneficial to the government (Nelson 1868, 142–143 of part V). On the whole, handsome financial returns were the main motivators in the initial days of the colonial rule in this basin. The debates within the government between the newly established PWD and the Revenue Department about the financial returns (from land revenue collections) of tank projects is taken up in the following sections.

The colonial divide – zamindari and ryotwari

However, the irrigation development was not undertaken evenly in all types of land settlements under British rule. The colonial government chose mostly the *ryotwari* areas for irrigation development within the presidency. It is rare to find any major exclusive schemes to develop irrigation facilities in the *zamindaris* of Vaigai. There were specific legal reasons for choosing *ryotwari* and some aspects of this are discussed in chapters 4 to 6. By law, in *ryotwari* areas, the cultivators were dealt with directly by the government and any social unrest arising out of taxation had to be dealt with by the government. In the *zamindari* areas*,* the *zamindaris* dealt with the cultivator and government had no or a limited

[28] In 1861, the *ryotwari* areas of Madurai district had an irrigated area of 182,887 ac and generated Rs 684,053 as land revenue; the dry cultivation stood around 1.22 million ac and generated 1.32 million Rupees. Computed from the statement No. IV produced by Nelson (1868, 142–143). The statement summarises different sources of Irrigation and revenue for the financial year 1860-61 within Madurai district.

development role. Therefore, the government had practical reasons for the maintenance of the tanks, its tax collections, and inclined more towards the *ryotwaris* throughout the nineteenth century[29]. They established officers to provide irrigation improvements in *ryotwari* areas as far as back in 1809 under the control of the Board of Revenue. One of the earliest such offices to work on tanks was established in Madurai district covering a part of Vaigai basin (Maclean 1987).

Most of the *ryotwari* villages were located in the middle and upper stretches and had *kallars* as one of the main inhabitants. They caused constant and continuous social disturbances. Their villages mostly depended on rainfed cultivation and to some extent on the undependable rainfed tank systems. This resulted in chronic droughts, food shortages and famines in this area. *Kallars* were part of the martial communities governed by a code of honour, who had served the previous native rulers as soldiers and later as watch and wards of villages in the region (Vandiyathevan 2012). They were also alleged by the British to be involved in thievery, dacoity, aggressive in nature, ready to rise up and fight. Therefore, when many of police actions failed the government tried to bring irrigation to their areas in order to control the social and political disturbances and succeeded to a large extent through schemes like Periyar (Francis 1906, 1:92). This policy of helping specific groups like the *kallars* through irrigation has resulted in new projects such as the Vaigai reservoir even in the twentieth century. Added to the financial returns the colonial government chose to develop schemes in the *ryotwari* areas under their direct administration.

Irrigation development in Vaigai

This section describes the origins of many grand ideas of linking rivers and creating big storage systems in reservoirs in the basin. This is done to show that the modern projects had its roots in the planning capacities of the natives.

[29] Developing irrigation in *zamindari* areas if any was incidental. No exclusive project planned focussing on *zamindaris* until the 1970s. An exclusive programme called Ex-Zamin Tank development programme came into existence at that time.

Many prominent British trained irrigation engineers of the nineteenth century including Cotton, Faber, Horsley, Ryves, Pennycuick worked in Vaigai basin at various times and contributed to technological advancements in irrigation. Horsley served in the eighth division covering two districts of Madurai and Tinnevelly for fifteen years until he retired in 1855. Technologically, Horsley claimed that he followed the native principles of engineering related to tanks, *anicuts* and rivers, and even took pride in following such models.

Horsley wrote,

> "In other countries and in India also, an engineer generally works on his own lines in developing any large scheme of irrigation and naturally credits his own skill and perseverance with the success of his undertaking. Here, I have no hesitation in saying that it has been an unmixed pleasure to me, from a professional point of view, to merely follow the lines of the original constructors of the *Pandiyan canal* because of the evidence of their skill and almost superhuman perseverance was so marked and I have in carrying out the works felt contended and fully satisfied to follow the footsteps of those whom I cannot but consider to have been masters in their art and facile precepts in irrigation engineering" cited by (Gulati 1965).

Horsley also established an European styled Tank Repair Department in Travancore state on the lines of the Madras PWD to develop tanks and *anicut*s (Travancore (India) and Aiya 1906).

Horsley could well be said as a pioneer who laid the foundations of future irrigation development of Vaigai basin. His achievements in Vaigai included repairing the ancient Chittanai *anicut* and re-developing the channel from Vaigai to extend irrigation to tanks in Gundar basin. He used similar principles as found in Vaigai to redevelop *anicut*s in Thamiravaruni including the redeveloping of Srivaiguntam *anicut*.

Horsley's proposals and suggestions to invest more on tanks as a measure of raising more land revenue in Vaigai basin are notable. About his work, efficiency and his personal knowledge of tanks, the Chief Engineer wrote,

> ... that without having brought forward any new projects of notable magnitude or extensive influence, the result of a careful, assiduous, and skilled attention to the duties of annual repair and improvement to no one locality more than another but to the steady patient maintenance of efficiency throughout all the numerous works of irrigation in his range, is an increase in wet cultivation during the last five years of his incumbency over the first five, of no less than 60,000 *ac*, with a corresponding revenue in excess, of 360,000 (three lacs and sixty thousand Rupees)[30].

Just by dealing with the problems in the *anicuts*, channels and tanks, Horsley could demonstrate substantial rise in irrigated area. This additional area of 60,000 acres amounting to one third of total irrigated area in the district at that time. This was a remarkable feat which is nearly unheard off until that time in this region. His summary report on tank development lists the financial returns, scope and future directions for this basin. He wrote regretfully about the attitude of the then government for their insensitiveness in taking up such redevelopment works in a large scale. However, he also noted that the tanks were 'repaired from time to time as occasion required, and are at present in a tolerably efficient state' with the limited resources made available to him[31]. According to him, 'anything substantial' in Madurai may not be possible without a scaling up of tank improvements that was not forthcoming. About future works in the basin he said, "I do not see that there is much room for such in Madura, except it be by damming up some of the mountain streams flowing from the Pulney range of mountains, so as to form extensive reservoirs at their foot"[32]. He reported that if such reservoirs are planned for the supply sources for tanks would become more sustainable and a greater extent of land could be brought under irrigation.

[30] No. 2449, Public Works Irrigation Department 1855, Letter from C.E.Faber, Chief Engineer to the Secretary to the Government dated 5th November 1855. (TSA Records PWD 1855)

[31] No 107, Civil engineers office, Eight Division, Madura dated 16th October 1855. Letter from Captain. Horsley, to Lt.Col.C.E. Faber, Chief Engineer, Madras Presidency. (TSA Records PWD 1855)

[32] Ibid. paragraph 8

In many ways, this 'damming up' of waters from Pulney hills was a new idea indicating the thinking about building large reservoirs independent of the existing tanks. The Madras government reluctantly acknowledged the usefulness of such proposals. The secretary in response to the ongoing discussions, between engineers and revenue officers said, "During the period [1840-55] included in [Horsley's] report no projects of great magnitude have been brought forward; but a steady attention has constantly been paid to the improvement of existing works of irrigation[33]". As a consequence of Horsley's projects, the revenue from the additional area had increased by 27 per cent in the first ten years, and 26 percent in the latter ten years and this was due to the improvements to tanks and channels credited to Horsley[34]. The period immediately after him saw the commencing of the process of recording the details of *anicuts*, channels and tanks[35]. However, Horsley's idea of building new reservoirs within the basin in the middle reaches had to wait for one century which we will discuss in section 7.5.

When such is the case in the *ryotwaris*, there was not much happened in irrigation development in the *zamindari* parts of Vaigai. Some discussions about poor irrigation development and the usurping the government water in Vaigai is available in Mosse's work. According to him, even during the peak of conflict (when mercenaries of the East India Company (EIC) were fighting for one or the local kingdoms during 1730-90), the local kingdoms within the lower Vaigai region

[33] No.925, Para no.8 of the Extracts from the Minutes of the consultation prepared by J.D.Bourdillon, Secretary to Government, dated 18th December 1855. (TSA Records PWD 1855)

[34] No.925, Para no.8 of the Extracts from the Minutes of the consultation prepared by J.D.Bourdillon, Secretary to Government, dated 18th December 1855. (TSA Records PWD 1855)

[35] Preparation of tank memoirs with maps detailing the river, *anicut*s, channels and tanks continued for a long time. The annual report of the PWD in 1887 said, "In the Central office 51 plates, showing the groups, sub groups and individual works with sections and masonry works for the Batlagunda, Suruliyar, Talavagai and Andipatti minor basins[covering the whole of upper and middle Vaigai], were lithographed (PWD 1887)".

did their best in developing many channels and tanks (Mosse 2003, 84). However, his study also shows that after the firm establishment of the British rule (after 1802) nothing significant happened. Rather many promises of giving waters from larger projects meant for Vaigai such as the Periyar never happened (Mosse 2003, 110–113)[36].

Periyar project: Designed to Serve Tanks

In the meanwhile, even grandeur ideas of bringing waters from Periyar for *ryotwaris* caught the imagination of the engineers and set the tone for the things to come in Indian irrigation. The technology, legal precedents, interstate and *intra* state disputes generated by the Periyar project are unprecedented and in many ways understanding the project equals an understanding of the interactions between the law, technology and conflicts in a colonial and post colonial country. This section summarizes some aspects of the technological history of the Periyar reservoir to argue how and why the colonial state chose Periyar project to its favour affecting a whole region.

Origins of Periyar Project

A cursory look at the present day map of Tamil Nadu and Kerala would reveal that every river in Tamil Nadu originating on the Western Ghats has a corresponding river flowing on the other side of the mountains in the Eastern Ghats. The western rivers had superior flows but no or less demand for the water inside their

[36] However, other historians such as Baker argue that the *zamindars* took away the government waters without paying for it (1984, 475–476). Similarly, Dirks argued that these *zamindari* estates gifted away the scarce revenue resources as a measure of strengthening their hold without much on reinvesting in developing land and water (1986, 312). I consider there were enough legal deterrents existed preventing the *zamindar*s to involve in water development because of the legal situation prevailed at that time. Discussions in chapter 5 and 6 would show that every *zamindari* effort in different parts of Madras presidency is dragged to court by the government. The body of water law developed from these cases tend to show the government disallowed anything done meaningfully by *zamindar*s.

basins. People in Vaigai region are aware that the surplus flows on the western side of the mountains could be useful to them. Nelson wrote about using the waters of the western rivers and usefulness of Vaigai to convey them in the following words,

> …The irrigation of the district [Madurai] depended mainly on the amount of water which comes down the Veigei [Vaigai] and probably the only kind of work by which it would be possible to greatly advance the agricultural interests of the country would be one planned to make the Veigei more useful than it is. *Such a work is now under consideration*…. (emphasis added) (Nelson 1868, 54 part V).

That consideration referred to by Nelson was to link Periyar with Vaigai. At the time of Nelson's writing, Periyar project was still being debated for its technical designs of the dam and conveying channels. Many scholars tend to think of projects diverting rivers involving transfers of water over long distances for irrigation as a result of 'imperial science' (Gilmartin 1994) and flood control methods as 'colonial hydrology' (D'Souza 2006). Some others even consider them as unnecessary and hubristic engineering (Iyer 2007; 2011). But, at least in the case of Vaigai, such ideas appear to be of indigenous origins and well recognised by the British geographers and engineers as native thinking. Citing C.R. Markham, the British geographer who explored the possibility of getting Periyar River into Vaigai, Nelson (1868) wrote

> in 1798, Mutu-akula-allay[37], the energetic Pradani or minister of Ramnad, whose name is still remembered by the people, determined to renew the efforts made by former ministers; and for this purpose sent some intelligent natives to examine the practicability of opening a channel for turning the Periyar into the Cumbum valley. They reported that the construction of a dam would secure abundant supply of water to all the

[37] Mutu-akula-allay is a corrupt version of the name Muthu Irulappa Pillay. Nelson cited the year of his efforts as 1798; however this may be incorrect because Muthu Ramalinga Sethupathy, the last of the Ramnad Kings, was deposed in 1795 by the British. Therefore, it could have been made earlier. The king of Ramnad was said to have major differences with Pillay, who was thought of as a pro-British man, and declared him a traitor and drove him out of office before he was deposed (Ramaswami 1972).

> Districts through which the Veigei [Vaigai] flows, and the project continued to be eagerly discussed, until two years afterwards the idea was taken up by the then Collector of Madura (Nelson 1868, 55 of part V).

As understood, Pillay was pursuing his predecessor's negotiations and hence the project could have been under discussion even before the time cited by Markham. There is also reason to believe that the conception of linking Periyar river with Vaigai had its basis in the ongoing practice of inter-basin transfers into Saruganiyar and Gundar of ancient days. After all, Periyar also flowed in the ancient Tamil kingdom of the *Cheras* that was known as the land of Periyar.[38] Markham, in his geographical report of the area, also reported that herdsmen from Madurai used Periyar valley to graze their animals on the hills and traders regularly crossed the river with goods for sale in the region (Markham 1866, 185). Thus the knowledge of the area and scope of the river must have been known to those who lived on the eastern side of the Ghats.

A century of planning and execution

Since 1802, the scope of Periyar project was studied by a range of experts including revenue officers, geographers and engineers. The investigations for a feasible and practical engineering proposal started in 1808 and culminated in 1872. The project included a dam of 155 ft height, a tunnel of 5700 ft long, a main channel and twelve branch channels to convey waters. This project realised an irrigation of 13,000 ac in the upper reaches (Cumbum valley) and 75,000 ac of single crop and 45,000 ac of double crop in the middle reach of Vaigai. (Mohanakrishnan 1997; Chief Engineer, Irrigation 1984a; Francis 1906; Mackenzie1899; Pennycuick 1886; Nelson 1868).

The engineering and bureaucratic discussions to have or not to have Periyar reservoir took unusually long time, nearly the whole of nineteenth century. It took seventy five years to arrive at a project proposal, 11 years to get the

[38] The Sangam poetry, Pathitrupattu, 28,10-11 calls it as 'Periyatruc Cirutai viyanpulam' (Pasupathi 2010)

sanctions from the Government of India, eight years to complete the dam and channels, and another two years to alter the *Peranai anicut* from where waters are picked up. All the engineers, planned to use the existing river, *anicuts* and tanks in order to realise this irrigation potential. All the proposals were designed to serve *ryotwaris* in Madurai district. A limited extent of 15,216 ac under *zamindaris* were benefitted. These were incidental in nature because they were lying in between[39] *ryotwaris* and cannot be by-passed. The project papers mentioned that, since the law is not settled on how much to charge these areas whether Rs 1 or Rs 10, the lower rates were taken up for evaluating the project (Pennycuick 1886, 75).

Both Vaigai and Periyar originate in the same mountains nearby, the difference being that Periyar flowed west and Vaigai flowed the east. Periyar project in essence is all about forming a dam and reservoir on the mountains of the Western Ghats by stopping and diverting the flows of the west flowing Periyar into the east flowing Vaigai. The waters are conveyed through a tunnel drilled on the rear side of the reservoir into Vaigai. The 'Periyar waters' that flowed in Vaigai is measured and picked up at 135 km away from the point of release and utilized in new areas hitherto not benefitted by Vaigai river.

The final project used the entire existing infrastructures with minimal or no changes. It included the River Vaigai, many river channels, *anicuts*, other channel networks and the tanks being used for the Periyar project (Pennycuick 1886).

[39] As per law applicable at this time, these *zamindari* tanks could take the waters from existing channels without paying anything extra. This aspect of law is discussed in the previous chapter. This law is one of the reason for the government to ignore *zamindaris* altogether from undertaking any new work until the *zamindar* clearly agrees with the financial burden. However, in basins like Vaigai where the political divisions (*zamindari and ryotwari*) coincided with the lower and upper Vaigai. Hence, the British government decided to go for as many projects as possible in *ryotwari* areas without bothering the *zamindari* at the lower end.

About the use of *anicuts* and rivers, the acting chief engineer O.P.Hasted, reasoned,

> After much consideration it was decided that water now thrown into the Sooroolly [Suruli] and Vigay [Vaigai] should be passed round the existing *anicuts* and not over them. It is to be noticed that all these *anicuts* supply Government land [*ryotwaris*] exclusively, and that therefore there is no reason to anticipate difficulty from interference with the existing supply. The additional water sent down the river will of course benefit existing cultivation; but as the *anicuts* supply but a very few tanks and the surplus all falls back into the river, there can be but little waste of the water. The designs of some of the works may need modification to some extent, but generally they are approved and may be accepted. (Pennycuick 1886, 73).

Therefore, the existing land revenue laws and the technology options proposed in the project were well suited to the goal of maximising profits from the government areas- the *ryotwaris* alone. Waters of Periyar project stopped at the borders of the Sivaganga *zamindari* and benefitted the Melur taluk under the *ryotwari*. Above all, the original proposer of the project the *zamindari* of Ramanathapuram was completely left out.

The project details

The project had six elements which included: damming the wild river Periyar ; forming a huge lake to store water on top of the mountain; boring / tunnelling the un-surmountable mountain to reach the other side; diverting and running Periyar waters into the tributaries of Vaigai; strengthening the existing *anicuts* and establishing new distribution networks; and using the existing tanks as storage systems. Of all these, building the dam is the most challenging work done in inhospitable mountains. The main dam is 1,200 feet long, and the weir connected three hills at a level of 2800 ft MSL. A small hill of 420 feet long was chiselled to make the weir on the dam side. The full reservoir level[40] (FRL) is fixed at 152 feet, and at that stage water submerges an area of 6,534 *ac* and hold 15,560 Mcft

[40] Though the final approved proposal fixed as 155 ft, during the construction it was decided to fix as 152 and ever since it remains so.

[440.61 Mcum] of water. Of this volume, 9,800 Mcft [277.51 Mcum] is usable and 5,700 MCft [161.41 Mcum] remains in the gorge and is forever dead storage forming the lake. A 5,700 feet long tunnel drilled on the hills conveyed the water into Vaigai. When the project was finalized there were no engineering precedents anywhere in the world. The reservoir is twice the size of the largest lake in Britain, and the peak flow in Periyar was 15 times higher than the Thames. The reservoir was named as Periyar lake after the river. (Mohanakrishnan 1997; Venkatasamy 2007). Arthur Cotton, a votary of this project, called the reservoir as 'Periyar tank' in his grand list of Irrigation projects in India (Cotton 1900)

Once the tunnel releases water, it directly flowed into the tributaries of Vaigai-Vairavanar and Suruliyar, and then into Vaigai itself. After flowing 138 km inside Vaigai, the waters were measured and picked up at Peranai, an *anicut* built before the tenth century[41]. The newly excavated Periyar Main Canal (PMC) conveyed Periyar waters for the next 61 km and delivered into 12 branch channels and its many distributaries. These distributaries were aligned on the pre-existing channels and the project altered their carrying capacities in order to ensure a measured delivery of water *only* to the intended areas. PMC is aligned as a contour canal and hence it could supply waters contiguously for the most part. All the branch channels ended up in big tanks, and drained any excess floods or surpluses into Vaigai river further down. These tanks were centuries old. The irrigation under these pre-existing tanks alone constituted around 65 % of the total area benefitted by Periyar waters. The government calls the Vaigai basin as Periyar-Vaigai (PV) basin and differentiates the historic users of Vaigai as Old Vaigai and the new users as Periyar areas. The Figure 7.6 shows the tanks in upper Vaigai in Cumbum valley, Figure 7.7 shows the Periyar channel areas, and Figure 7.8 the lower Vaigai areas.

[41] T.M.Srinivasan (1992) infers from the inscriptions found on the village nearby that the *anicut* could have been in existence well before tenth century. Also, epigraphists studied the nearby ancient villages of Thenkarai, Karumathur, and Vikramangalam believe the structure could have been in existence since 7th century (Chandramurthi and Vedachalam 2002).

Mohanakrishnan, a water technologist and a long serving water policy advisor in India, suggested the tanks and other direct command areas chosen for the supply of Periyar waters was purely based on technical reasons. These include topography of the area, nature of soil, and availability of over 1000 old tanks that suffer from the fluctuating and undependable water supply (Mohanakrishnan 1997, 75). However, what is not stated is that the topography, soils and tanks in the adjoining Sivaganga are no different than the Melur[42]. It is not difficult to infer that they were *zamindaris* and hence kept out of the purview of the Periyar project.

The government ensured the transfer of Periyar waters only to the *ryotwaris* managed by their own bureaucracy by maximising returns in a limited area. It has to be understood that out of the 75,000 ac area the project designed to provide water in Melur taluk, 45,000 ac is for the second crop. If the intentions of the government was altruistic to control famine as it was argued at some stage of planning, the double cropping in an area should not have been needed. Rather, the same waters could have been extended to other single crop areas. However, the single crop areas were only available in the Sivaganga and Ramnad *zamindari* to which the government did not intend to extend irrigation. Sivaganga did have numerous tanks almost similar if not with the same technical features. In fact Sivaganga suffered from chronic water shortages and migrations even more than the Melur taluk under *ryotwari* at that time[43]. Therefore, it is difficult to agree that technological considerations alone led to such a decision of limiting to tanks in Melur taluk. It is purely a political decision to benefit the *ryotwari*. Here lies the roots of all conflicts.

[42] See the soil survey report by (Natarajan 1997), and Season and Crop Report of Tamil Nadu (2007a).

[43] Mosse provides an account of such chronic water shortages driving villagers into out migration from the *zamindaris*. He also lists occasions wherein the *zamindaris* showing eagerness to contribute for extending the Periyar into their areas in Gundar and Saruganiyar (Mosse 2003, 111). However, no such works were done in reality.

When the reservoir was undertaken, the influential Royal Geographic Society's monthly journal reported about the possibility of handsome profits and the difficulties,

> The difficulties of the undertaking were increased by the nature of the country – jungle-clad, malarious, and uninhabited–and the altitude (2800 feet) to which the materials had to be dragged up steep slopes with an average gradient of 1 in 15, four large unbridged rivers also having to be crossed on the way from the nearest railway station. …the total cost of this beneficent undertaking has been less than half a million sterling at the present rate of exchange, on which outlay the direct profits should yield a handsome return (The Society 1895, 567).

When the reservoir completed one hundred years of performance, Mohanakrishnan, wrote in the commemorative volume that,

> Periyar dam project is a mammoth engineering project boldly conceived and courageously executed by men of indomitable will both native and foreign in the most inhospitable environment against all odds foreseen and unforeseen, with a praiseworthy commitment to the task, with the only conviction that it will bring prosperity to an area frequented by poor people who deserved all the help to improve their standard of living (Mohanakrishnan 1997, 299).

Whatever be the perception, whether looking for a handsome profit as felt by the Royal Geographic Society's journal or serving the poor as felt by Mohanakrishnan, the project undoubtedly became highly successful and surpassed every target set for it. The planners and those carried out the project are revered by people in the upper and middle Vaigai region in Kambam and Melur *Taluks*[44].

However, the project was not seen very positively by the lower Vaigai people because it brought new difficulties for them in using the river, tanks and other pre-existing works. First of all, the project benefits were solely focused on the

[44] Most importantly, Pennycuick, the engineer who led the building of the dam is revered by the farmers. His statues are found in the dam, headquarters of the department, in local towns and public facilities named after him. His birthday which also falls on the Tamil New Year is celebrated to honour him in many villages where Periyar water flows.

ryotwari areas that were not using the river (prior to this) in any significant magnitude. Secondly, the *technical modifications* made to the pre-existing *anicuts* negatively affected those who were in the LVR. Thirdly, a new set of laws came into existence based on the understanding of Periyar project that greatly affected the Indian water law. Fourthly, a different management system (in using the river) was put in place where the engineers controlled the river and depriving the role of communities. Fifthly, the river Vaigai that was free flowing until the arrival of Periyar scheme, became a totally controlled hydraulic system (with many reservoirs, gates and altered channels on its way) leaving limited options for the tanks.

Periyar project has created other conflicts too,[45] of which some are already resolved[46] and others ongoing in the Indian Supreme Court. These conflicts do have some ramifications in reducing total water availability within the Vaigai basin. However it is not taken up for the discussion here in this research.

[45] An interstate conflict is raging between the state of Kerala and Tamil Nadu about the Periyar river and the reservoir. The many issues raised in this dispute include the age of the dam, its strength to withstand any earth quake, environmental damages caused by the reservoir, sovereignty of the land owning state to control the dam owned by other states, and validity of agreements made by princely states with the British. At this time in 2013, the height of water storage in the dam was unilaterally reduced from 152 ft to 136 ft by Tamil Nadu and the case is being heard by Indian Supreme Court to resolve some of the issues connected to the dispute. A summary is available at http://wrmin.nic.in/index3.asp?subsublinkid=739&langid=1&sslid=733 [Accessed on 03 July 2013].

[46] *Mullaperiyar Environmental Protection Forum v Union of India, [2006] AIR(SC) 1428*

7.4 PART III ROLE OF LAW AND THE COURTS IN CHANGING AN ANCIENT ANICUT - FISCHER'S[47] SUIT

In this section, I detail the first major basin level conflict between the LVR and the new Periyar project affecting tanks. This conflict arose due to the changes made on the *anicut*, channels, river and subterranean flows (below ground water flows) covering the important technological aspects associated with tanks and rivers. The changes done by the government was meant to take the water to newly created irrigated areas by Periyar project.

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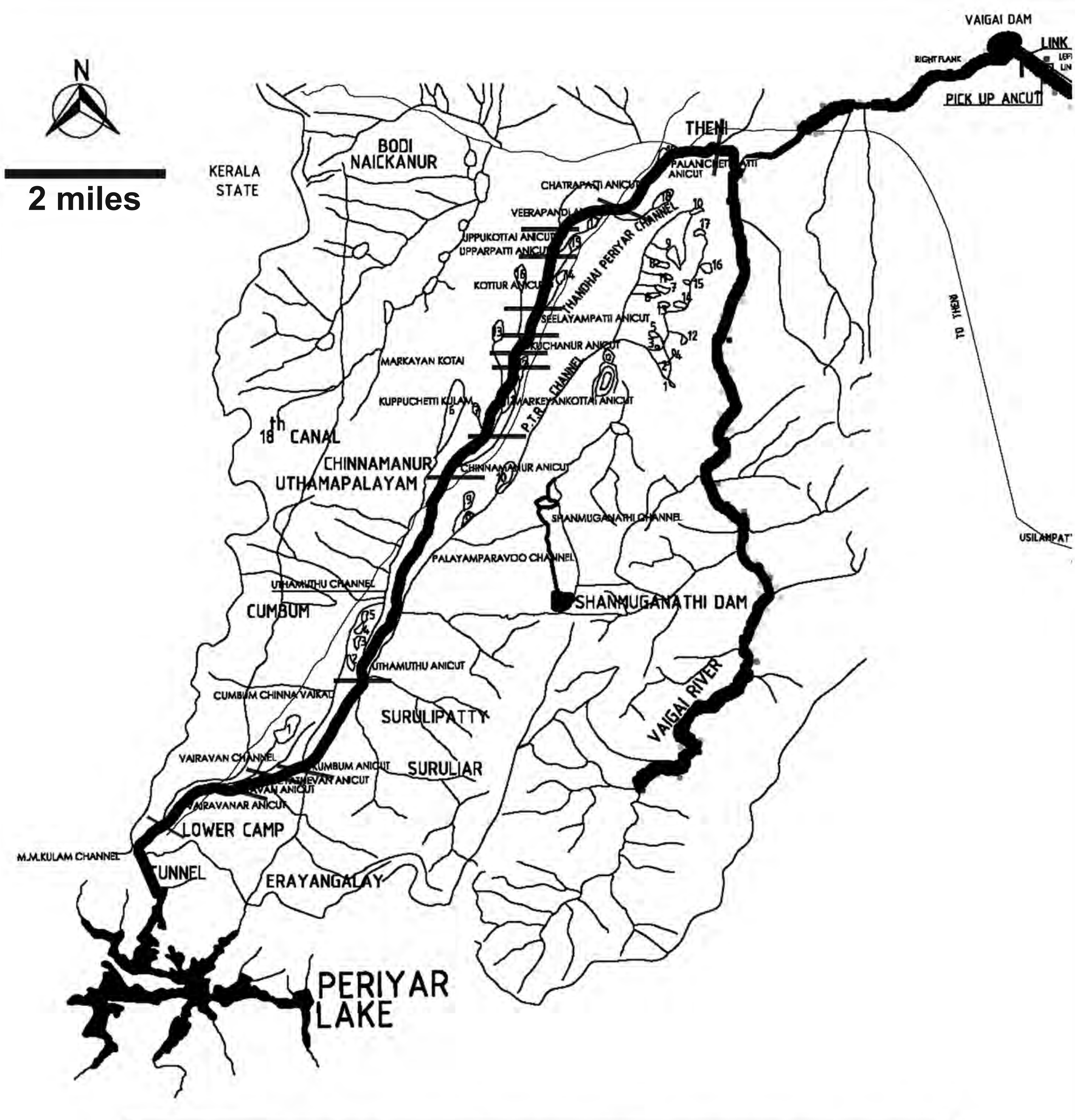
[47] *Robert Fischer v the Secretary of state for India, Madras High Court, [1908] 2 Ind Cas 325*



S.NO.	NAME OF CHANNEL	AYACUT IN AC
	CUMBUM VALLEY - DOUBLE CROP	
1.	M.M.KULAM SUPPLY CHANNEL	385.00
2.	VAIRAVAN CHANNEL	1700.00
3.	PEYATHEVAN CHANNEL	353.00
4.	CUMBUM CHINNA VAIKKAL	1520.00
5.	UTHAMUTHU CHANNEL	2421.00
6.	PALAYAMPARAVOO CHANNEL	2441.00
7.	CHINNAMANUR CHANNEL	1629.00
8.	MARKAYAN KOTTAI CHANNEL	500.00
9.	KUCHANUR CHANNEL	658.00
10.	SEELAYAMPATTY CHANNEL	468.00
11.	KOTTUR CHANNEL	719.00
12.	KOOLAYANUR CHANNEL	176.00
13.	UPPARPATTY CHANNEL	401.00
14.	UPPUKOTTAI CHANNEL	312.00
15.	VEERAPANDI CHANNEL	434.00
16.	CHATRAPATTY CHANNEL	237.00
17.	PALANI CHETTIPATTI CHANNEL	153.00
	TOTAL	14707.00
	P.T.R. SYSTEM (SINGLE CROP)	
1.	P.T.R. CHANNEL	1726.00
2.	THANTHAI PERIYAR CHANNEL	3420.00
	TOTAL	5146.00
	SHANMUGANATHI RESERVOIR	
1.	SHANMUGAHATHI CHANNEL	1660.00 (DIRECT)
2.	LENGTH OF CHANNEL	18.13 K.M.
	TOTAL	5146.00

S.NO.	NAME OF TANKS	AYACUT IN AC
	PERIYAR SYSTEM TANKS	
1.	MATHALAMANNADIKULAM	385.00
2.	PERIYAKULAM TANK	73.00
3.	ODAPADIKULAM TANK	62.00
4.	OTTUKULAM TANK	54.00
5.	VEERAPPANAIKENKULAM	198.00
6.	KUPPUCHETTIKULAM TANK	521.00
7.	KATTATHIAMMANKULAM TANK	43.00
8.	KALUNEERKULAM TANK	124.00
9.	THAMARAIKULAM TANK	543.00
10.	KARUNKATTANKULAM TANK	755.00
11.	UDAYAKULAM TANK	244.00
12.	SENGULAM TANK	120.00
13.	SUNDAYANKULAM TANK	91.00
14.	SIRUKULAM TANK	141.00
15.	NARAYANASAMUDRAM TANK	206.00
16	KARUVALANKULAM TANK	99.00
17	SENGULAM TANK	79.00
18	VAYALPATTIKULAM TANK	109.00
19	KANNIMARKULAM TANK	104.00
	TOTAL	3951.00
	ANI CUTS IN CUMBUM VALLEY COMMAND	
1.	VAIRAVANAR ANICUT	
2.	VAIRAVAN ANI CUT	
3.	PEYATHEVAN ANICUT	
4.	CUMBUM ANICUT	
5.	UTHAMUTHU ANICUT	
6.	CHINNAMANUR ANICUT	
7.	MARKAYANKOTTAI ANICUT	

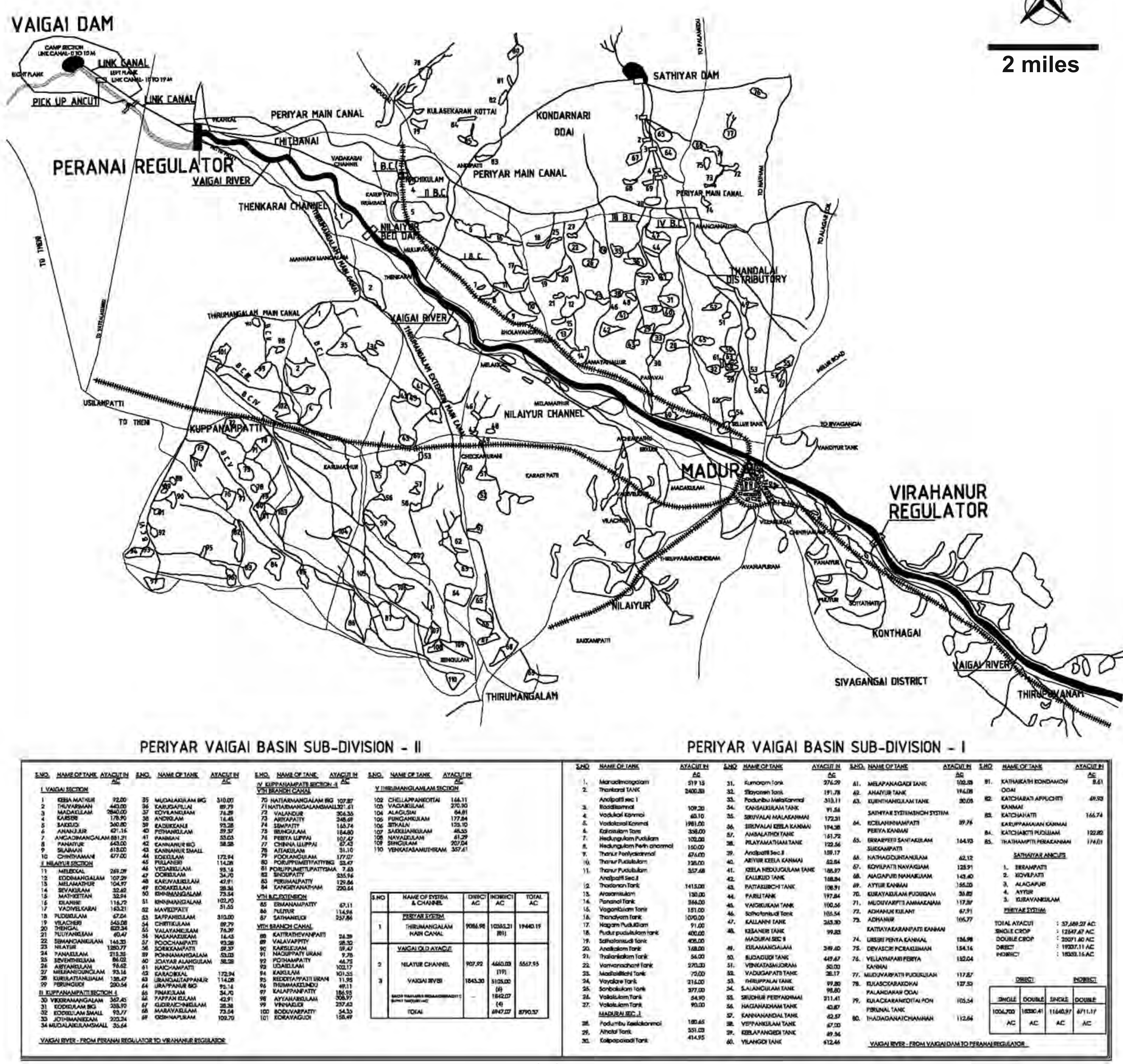
S.NO.	NAME OF TANKS	AYACUT IN AC
	TANKS UNDER PTR CHANNEL SYSTEM	
1.	VALASAMUDRAM TANK	59.72
2.	SRIRANGAGOUNDANKULAM	9.25
3.	SIKKANAGOUNDANKULAM	3.72
4.	KAMACHIPURAM TANK	9.55
5.	NANTHAVANAM TANK	10.00
6.	THONTHIMALAYAN TANK	17.31
7.	NALLUCHERRY TANK	53.36
8.	PALANIMUTHUGOUNDAN TANK	24.20
9.	THADICHERRY TANK	172.75
10.	PUDUKULAM TANK	71.12
11.	THATHAYAGOUNDAN TANK	14.85
12.	KANNIMARKULAM TANK	12.65
13.	BALUCHERRY TANK	56.54
14.	VANNAKULAM	10.80
15.	GOVINDANAGARAM TANK	75.26
16	AMBASAMUDRAM TANK	72.00
17	BALAKRISHNAPURAM TANK	74.42
	TOTAL	747.50
	ANI CUTS IN CUMBUM VALLEY COMMAND	
8.	KUCHANUR ANI CUT	
9.	SEELAYAMPATTY ANICUT	
10.	KOTTUR ANICUT	
11.	UPPARPATTY ANICUT	
12.	UPPUKOTTAI ANICUT	
13.	VEERAPANDI ANICUT	
14.	CHATRAPATTY ANICUT	
15.	PELANI CHETTYPATTY ANICUT	

Fig.7.6 Tanks benefited by Periyar Flows in Cumbum Valley

Source: Executive Engineer Periyar Vaigai Basin, WRO-PWD

Fig.7.7 Tanks benefited by Periyar Flows in Middle Vaigai

Source: Executive Engineer Periyar Vaigai Basin, WRO-PWD



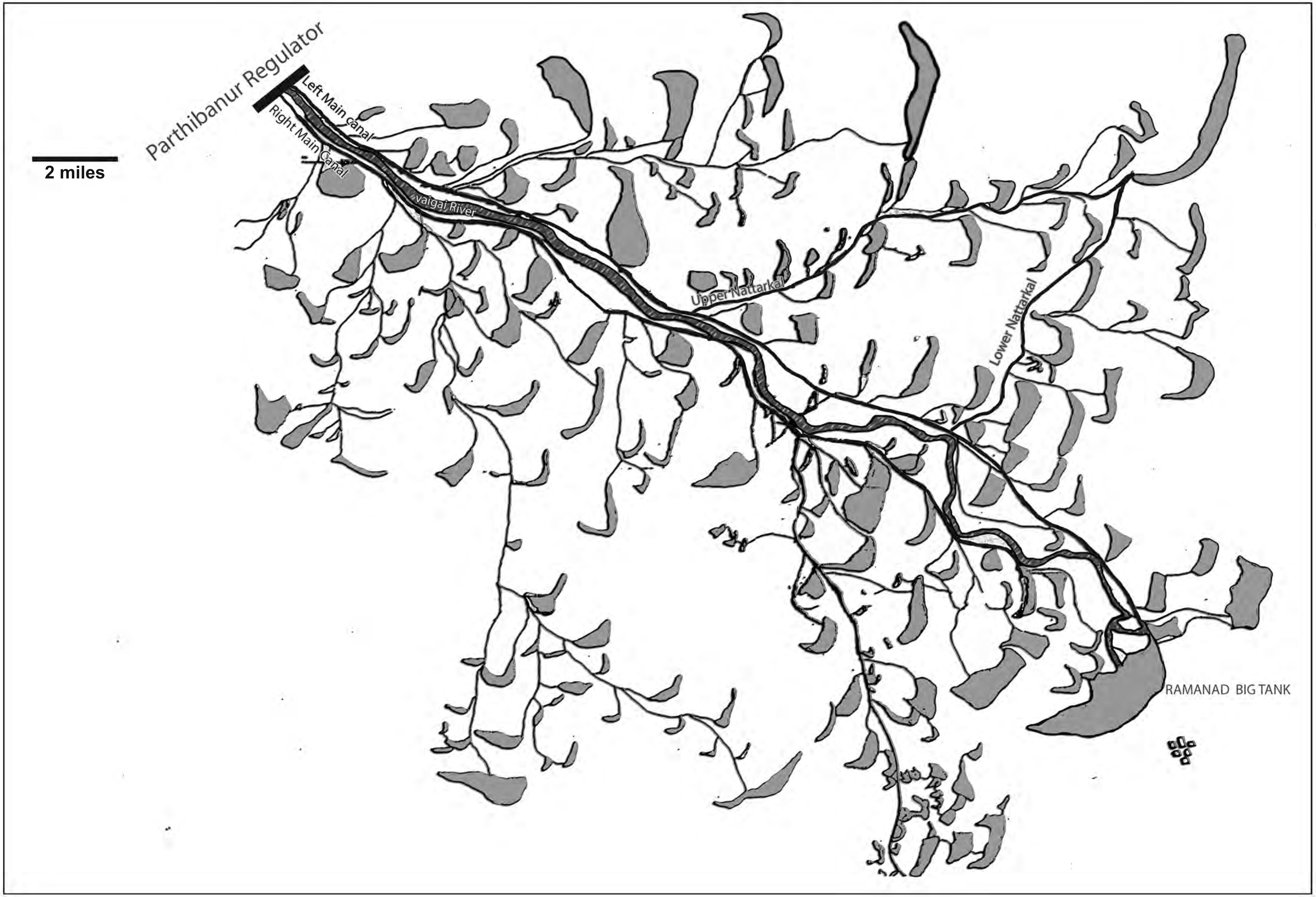


Fig.7.8 Tanks benfited by Vaigai River Flows in Lower Vaigai Region

Source: Executive Engineer, Lower Vaigai Basin WRO-PWD, Tamilnadu

Altering the river hydraulics

In 1896, Periyar started flowing in Vaigai and the tanks and villages in the upper and middle reaches were provided with stable sources of supply (Francis 1906). But tanks and villages in the lower reaches in *zamindari* areas felt differently. In 1901, Robert Fischer[48], a British man and a renter within the Sivaganga *zamindari* brought a civil suit before the district court claiming water to his villages had decreased. It is not known clearly whether the *ryots* from Ramnad, that was further down and east of Sivaganga joined him in this civil suit[49]. Sivaganga

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[48] According to Price (1994), Fischer's family remained powerful at this time and well versed with the political situation prevailed in the area. In 1864, Fredrick Fischer, father of Robert helped a faction within the family of the *zamindar* who were fighting themselves to control the *zamindar* finances in the District Court. As a reward of his counsel and advice the *zamindar* a woman who won the court battle gave him the entire *zamindari* lands on lease with a condition that he pays a rent of Rs 100,000 per annum to her. From his rest of the collections, he had to pay to the British government fixed peshkash (tax dues from *zamindari*), and do any other development work that is required to be done in his villages. At that time of this deal, Sivaganga *zamindari* had an estimated revenue worth of over Rs 2 Million. After the death of Frederick his son Robert Fischer inherited the lease and made over the unexpired lease period to another Indian renter for Rs 400,000 (Price 1994). At least, over two thirds of the revenue came from the tankfed villages. However, his litigation only referred to five villages that were very close to the river.

[49] Some farmers associations presently involved in litigations and mobilisations over the river claim their ancestors from Ramanathapuram *zamindari* did support Fischer in his legal action. Mr.Raghunathan of All India Kisan Sabha (AIKS), Ramanthapuram (met on 15 September 2011) claims farmers of Ramnad did support Fischer in this case. He believes more than Fischer who is reasonably in upper reaches, tanks in the Ramnad *zamindari* were worse off, and there is no reason to believe ryots in this lower reach would have kept themselves away from the case. He believes, being a British, Fischer was well versed in politics, law and courts and hence he was made the main plaintiff. Ragunathan also told me that after the unsuccessful attempt at the District and High Court the case went on appeal to Privy Council. But was withdrawn on account of financial constraints and assurances made by the government to the *zamindaris* of Ramnad and Sivaganga. However this could not be ascertained from any available records or publications.

zamindari at this time had 40,000 *ac* of tankfed lands dependent on Vaigai at that time as per British records[50].

Understanding the location of Fischer's villages will help us to understand some of the technical aspects related to water flows raised in the suit. His villages lie below the Peranai *anicut*, two of them cited in the case (Thoothai and Pappangulam) are on the banks of the river, and three villages (Ananjiyur, Kondagai and Karisalkulam) are fed by channels from the river. Karisalkulam village was the last among his villages. Between Peranai and Karisalkulam there were sixty channels taking off or leading to the river either to draw or drain water.

Pre Periyar situation

Peranai *anicut* is located 138 km from where Periyar waters are let inside river Vaigai. The *anicut* is 1,319 feet long and crossed the river obliquely[51] from south to north. It had some unique technical features[52]. The diverted water entered Vadakarai or Vadakal channel and fed ten smaller channels leading to tanks irrigating a total of 11,000 ac. All the channels ended up again in Vaigai at a little distance further down. It could be said that the design of Vadakarai is such that the river takes a *detour via the channel* and comes back to its course after some distance serving exactly 11,000 ac of the area. The design did not allow to take water to any other areas.

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[50] This figure is contested by Sivaganga ryots and their petitions in 1952 claim 160,000 *ac* of tankfed *ayacut* dependent upon Vaigai. Since, *zamindaris* did not have accurate records as that of the *ryotwaris*, it was not known for sure how much area was under Vaigai. It is very common to hear from people in villages that are far away from the river about their tank getting water from Vaigai long ago.

[51] Discharge depends on the length of the weir. By making a zigzag line the length is increased and hence the discharge increases. This is a conventional technique followed in almost all ancient *anicut*s.

[52] The crest of the southern side of *anicut* was lower by a feet compared to the northern. The river bed was not uniformly deep at this place and southern end was elevated.

After Periyar project, the following changes were made:

Periyar regulator: A new regulator was built on Vadakarai channel to measure and pick up Periyar waters. This can be manipulated to increase or decrease the flows that enter and exit the Vadakarai channel and Periyar main channel.

Modifications in Peranai

(i) In 1897, two years after the commencement of Periyar waters, the crest of the Peranai *anicut* was raised temporarily by turf bunds made of straw and mud for 3-4 ft. The government said large volume of silt came along with Periyar waters that were dumped at the *anicut* and hence this change. Fischer objected to this practice citing the law that the government has no rights to alter the features of an ancient *anicut* that is used by hundreds of villages below it. The silt could have been removed or flushed out through scouring sluices as done in the past in the nearby *Chittanai,* but the government preferred to raise it.

(ii) In 1899, the practice of forming temporary bunds was abandoned and a permanent construction for a shutter of 2.25 feet was installed. Also, the crest level of the Peranai *anicut* on its southern portion that was lower by one foot was altered (raised) and made uniform with north flank.

These changes enabled more water to flow into the opposite side where the Periyar Main Canal is taking off.

At this stage, the case commenced in the district court.

(iii) In 1908, before the case was finally resolved, these shutters were dismantled and a permanent construction was made. New sluices were fitted at the bottom to regulate the entire flow of the river.

These permanent change altering the hydraulics of the weir, channel and *anicut* was objected by Fischer. None of these changes were proposed in the Periyar project and all of them were done after the main project was completed and irrigation commenced. This raised a doubt in the minds of the *zamindaris*: why should they change an *anicut* that serves only them beyond this point?

Modifications in the channel

The original width of *Vadakarai* channel was 40 ft and after the project it was made into 100 feet.

As a result of this change made, it carried at least three times the previous flow.

All tanks served by *Vadakarai* channel required 305 cusecs for around 52 days. The modified Vadakarai channel could carry more than three times of the previous discharge for any number of days. The return flows after filling all tanks of Vadakarai may or may not come back into the river. This is because the channel is fully controllable by the regulator that did not exist previously. Said simply, nobody knows how much of the flows comes back. Fischer alleged that it does not come back and hence taken by the government for *ryotwari* areas.

To summarize, after all the changes made by the government, it may be said that the *anicut*, the channel and the river became fully controllable by the government (PWD) that only served the *ryotwari* areas.

Government defenses

The government gave a very simple defense. This included:

(i) it is *the owner of the bed* of the river at that location and hence water flowing therein makes it a riparian.

(ii) the action did not diminish the flow, for which *no definite proof* was submitted by Fischer.

(iii) changes in the channel and the *anicut* were done *only* to utilize the increased supply of Periyar water

After seven years, the suit in District sub-court was dismissed and decided in favour of the government action as prospective and premature with no proven substantial injury shown by Fischer.

On appeal from Fischer, the High Court agreed with the Sub-court. Also it said, 'the government is a riparian owner' because the location of *anicut* bordered a *ryotwari* village that belonged to the government. Incidentally, the village that was claimed as a riparian village never used the river water at any stage even after the Periyar project. Since, it was a *ryotwari* village and in law it was 'owned' by the government.

The Permanent injury

The court determined no reduction in the *total* water that flowed down Peranai. This is shown by measuring the volumes that flowed beyond *Peranai* for a two year period. However, the 'patterns and times of water flow' were not the same as cited by Fischer. This was not accepted by the court.

Water could have flown by Fischer's villages when it was not needed, but was accounted in the total. Total in a season may not mean much if it is not available on a timely basis. Water had to be made available as and when needed in tune to the cropping season and shortages at that time. However, the court only counted the total water flowed down.

How do we define 'permanent injury' in case of tanks? It is very difficult to establish in any short period of time. This is due to the cyclical nature of the monsoon systems, high variability of rainfall in the immediate and distant catchments. Therefore, at least one hydrologic cycle of twelve years, years if not many decades are necessary to find the injury.

The court neither waited nor intended to do such an exercise, nor did it allow the prior users to satisfy their needs first and allow the government use it later.

It may be relevant to cite here a similar case handled by the Pandya king in 12th century A.D. in the very same place[53] as in *Chittanai,* that is four km further down to Peranai. The king took a total of 12 years and had three sittings at different periods to assess and come to a conclusion of a similar issue. Till that time the contested channel was not allowed to be used by the new users though water was allowed to run. It appears from the inscriptions that the flows in the new channel did affect the old channels, and hence the new one was ordered to be dismantled. Therefore, understanding the flows in the river and channels need more than quantifying the total flows alone, and that was not done by the court.

Determining the quantity of water received in a tank

The government showed in court that agriculture in Fischer's villages did not suffer. This inference was arrived at from the cultivation records for the period of 1901-1903 that showed no reduction in wet cultivation and hence the court accepted there was no injury at all. The underlying assumption was that had Fischer's villages suffered for want of water (from Vaigai) it would not have succeeded in raising a crop as they did in the two year period.

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[53] Three pieces of lands were granted to certain sect of Brahmins and a canal was taken up from Vaigai to irrigate them. Since there was a channel already running below them the newly excavated channel was objected by the lower riparians, even though the royal order was in favor of the upper ones. The new acquirers complained to the king about this and the King did not want to revoke the local decision. The inscriptions say, the king heard the same case three times in his 11th, 16th and 22nd year of his rule (i-e. Year 1, year 6 and year 12 of the canal). Each time, he gave certain relief to the new acquirers in tax exemption but did not venture to ask them to use the channel. When the final decision was made the king upheld the claims of the initial users, ordered his minister to permanently close the channel and make another one below the existing one without violating the lower users. All the three proceedings were recorded in inscriptions (South India Inscriptions - Vol XIV No. 214:p122; No.223:p127; No.224 p 128; No.229:p132; No.236 p141 (Iyer 1968)). The principle that was used to dismantle the newly excavated channel resembles the modern doctrine of 'prior appropriation'. In Tamil, the verse reads: '*Kaal mael Kaal khollal aakathu*' roughly meaning 'a new channel (*Kaal*) should never be taken (*khollal aakathu*) above (*mael*) an existing one'- as interpreted by Chandramurthi and Vedachalam (2002).

Now further technological questions arise here to understand the vagueness of using such a simple logic to measure the injury. The water required to fill a given tank had four *distinct but interrelated* sources:

- Runoff from the independent catchment of the tank;
- Runoff from the combined catchment of the particular chain of tanks;
- Diversion of the subterranean flows;
- Diversion from the river.

It is a combination of these four factors for which no records existed at that time with anyone. For each chain of tank these four parameters vary. For each tank within the chain these parameters vary. No one knows how exactly one factor impacts the other, and one tank impacts the other, and one chain impacts the other chain, and hence the whole basin. Neither Fischer nor anyone had any records of water flow.

Fischer argued anecdotally that the water that reached his village tanks need not necessarily be from the river flows that came from Peranai *anicut.* It could have been either

- <u>from the rainfall runoff</u> of the catchments *between his village and Peranai*. As we saw, there were more than sixty channels that took off in between his village and Peranai that would have resulted in filling his tank and not necessarily from the river beyond Peranai.

  or

- <u>due to the subterranean flows in the river</u>. Since two of his villages were located on the banks of the river it might have been possible that waters from this flow helped the tank to get some supplies or cropping might have been undertaken using that water. These subterranean flows if he did not use it might flow down further to the lower down tanks beyond him. Indeed if he received from subterranean supplies that which belonged to the others (lower villages) a similar fate may happen to him on some day when others above him started to do the same thing.

In the case of tanks that depended on rivers like Vaigai, the issue of proving quantification in a conclusive manner would be *technically very challenging or next to impossible.* Given the decentralised nature of the tank systems, the absence of any instrumentation to quantitatively measure waters, and the non-availability of technical expertise in the villages, it would have been an impossible proposition to establish their point in a court that wants a definite proof of injury. That is, nothing exists to show sufficient technological understanding existed with anyone to prove or disprove the claims.

Importance of the case law

There are many implications of this case law. Some of them are

1. <u>Use of paramount powers, equitable development and the easement:</u> The court upheld the 'paramount powers' of government over the waters flowing in rivers as per the *Indian Easements Act 1882*. Paramount powers given in law are expected to be used for an equitable and fair development of the available resources. However, in this case, which was a conflict between two owners, one of whom was the government. The project is meant to make profits for one owner-the government. As we discussed in the sections 7.2 and 7.3, the government had no intentions of developing irrigation in *zamindaris,* and whatever they did using their 'paramount and sovereign rights' was only for *ryotwari* areas.

   The prevailing legal situation at the time: in case of artificial channels easementary rights are allowed and in natural streams they were not.

   Though Vaigai river was formed by act of nature, a large artificial stream of water brought by human effort was allowed to run in Vaigai and hence riv*er dynamic*s had totally changed. At the time of the case, the 'artificial stream flow from *Periyar* was much larger than the natural flows and hence treating Vaigai simply as a natural stream is only a convenience to take advantage of the law of easements.

On the one hand, government treated itself as an owner and used its privilege of a riparian to use 'reasonable amount of water'. On the other hand, it also used its sovereign right to alter the hydraulics of the river. Both positions are contradictory, either one goes by the Easements or the sovereign owner but using both in one single case in one single location amounts *t*o simp*le abus*e of law. The government thus stood the benefit of using the Easements and sovereign rights making a mockery of the fundamental principles that divide *the regime* of rights.

The government did not even try to show their actions as neutral to both *zamindari* and *ryotwari.* Though the idea of Periyar reservoir originated with the initiatives from the *zamindari* areas, the government took over the idea for its own profits. The court's understanding of 'no distinction can be drawn between cases of *ryotwari* and *zamindari'* is little more than a misconception. There actually existed material distinction in benefits of the whole scheme for which these changes in the river were made.

Revenue returns from *zamindaris* cannot be raised because they were permanently settled and any improvements in irrigation is the responsibility of the *zamindari*. Even if incidental benefits occur due to government irrigation programmes the government cannot stake a raise in revenue collections and hence there is no incentive for the government to do anything concerned about irrigation.

2. <u>Legal remedies:</u> The judgement also concluded the government's sovereign right supersedes all other rights including easements and prescriptive rights (of the lower riparians) that were protected by the law of easements. In such a situation, the options exist for lower tanks in Sivaganga and Ramnad is almost nil. Therefore, it is reason to believe the court ruling was another way of usurping resources by the government. If

we understand the land settlements that were in vogue at that time this becomes even more clearer. In the permanently settled *zamindaris* like Sivaganga and Ramnad the government had no role in developing land and water and not allow *zamindaris* to do anything meaningful.

3. The doctrine of 'prior appropriation' was not an accepted legal position in India and hence the court did not pass any opinion when raised and remained silent. Prior in time, prior in right is the basis for prior appropriation rights (Wiel 1914). The reasons were obvious, colonial rule did not respect the pre-existing rights in its entirety. It gave supremacy to the governmental action and used the principle selectively where it suits them subjecting to its paramount powers.

Is there a permanent injury

In summary, the entire case was decided on simplistic facts about - Is there any permanent injury and who owns the bed of the river?

Fischer's contention was changes made in the *anicut*, channel and the river allowed the government to take the water belonging to the downstream villages and reduces their customary share. As the present records and analysis made by experts and the PWD itself show the dependability of the tanks in LVR has gone down from 71.43 % from 1895 (pre-Periyar days) to 57.69 % in the next 27 years and came down further after some more changes (Shanmugham 2002). It is evident enough that all the technological understanding on which this decision was based has been wrong.

It is not my argument here to find where the waters have gone. It is obvious the growth in Periyar irrigation has to be scrutinized to find out this phenomena but it is enough to show that making changes in a time tested technological arrangement would lead to consequences that are detrimental to users lying far away in a decentralised system.

Fischer's suit about changes in Vaigai set a precedent in Indian water law as it gave the government a free hand in changing the face of tank irrigation in many basins. Out of the many subsequent cases used in Indian courts, this judgement is frequently cited to support government actions to bring new projects. The Vaigai basin, thereby had some lasting implications in Indian Irrigation law.[54] This case law, stands an example of how law is used to favour modern technologies resulting in establishing a centralized control by the government on highly decentralised systems like the tanks.

7.5 PART IV VAIGAI RESERVOIR (1908-1959)

In continuation of the Periyar reservoir in Vaigai other such activities gained momentum. While elaborating the process through which the technological interventions unfolded, this section argues that simple approximations (combined with simple and doubtful assumptions) were being used against the centuries of practical knowledge of tank farmers to bring them.

Basis for a reservoir

Horsley was the first one to suggest a large reservoir within Vaigai basin. Ryves, his successor, did envision a possibility that there was surplus water left after filling up all the existing tanks. In 1867, he said, "the character of Vigay [Vaigai] makes the tank system very essential. For some reason or other the quantity of water received into the channel of the river bears a very small proportion of the rainfall on the catchment basin (as quoted by (Pennycuick 1886, 1))".

Ryves was aware that the river flows are less than the estimated runoff that is based on assumptions but he tends to believe them more:

[54] Ever since this judgement came into effect, introduction of all kinds of irrigation development activities are undertaken in Vaigai and elsewhere. Refer to the many case laws discussed in chapter 6 and chapter 9 about this 'development' phenomena.

> Taking it at only 33 inches for the whole catchment basin above Peranay [Peranai], it would amount to 3,600 million cubic yards per annum, and supposing that only one third of this found its way into the streams and rivers so as to be available for irrigation, there would be more than enough (with due allowance for enormous waste on tanks) for three times the extent of paddy crop now raised. Yet it is affirmed in good authority that, in an average year, not a drop of water reaches the sea; but this I think is hardly sufficiently well established to be accepted as the fact. (Pennycuick 1886, 2).

According to this computation, taking an average annual rainfall of 33 inches, the river must carry 97,200 Mcft [2,752.4 Cum] of surplus in a year. Though his estimated flow was substantial, nothing of that sort flowed down. He believed without much basis that,

> My belief is that sufficient water for more than double the present area of irrigation does flow down the Vigay, but that three fourths of the annual supply passes down the river at three times the rate at which all the channels together can draw off water from it, so that if the big freshes could be detained, so as to spread over, say 60 days, instead of running off at three times the rate in 20 days, it would be found that there would be water enough for the tanks could contain what it would be necessary to store) for double the area of rice crops (Pennycuick 1886, 2).

In a way, Ryves ignored the practical understanding of Vaigai but had too much confidence on his runoff estimates for which there was not much basis. At that time, none had any long term flow measurements or rainfall data for this assertion. Yet, the ‘big freshes’ after filling up all the tanks on the way, was assumed as surplus and that could be stored somewhere in the middle reaches. The understanding developed by him was to establish a massive reservoir on the upper or middle portions of the river.

His idea revisited out after many decades and formed the basis for a new reservoir project in the 1940s. The final project proposal of Vaigai reservoir, in 1948, included Ryves’ conclusions about the surplus and a need for reservoir as its basis (PWD 1954). However, doubts about such a big surplus were lingering in the minds of many. Different proposals made prior to 1948, with serious investigations to find a suitable site for the reservoir, plan for the channel networks, and beneficiary tanks were shelved. Of all the known reasons cited for their 'infeasibility', the doubt about the availability of water seemed to be the most serious. The government did not proceed to build a reservoir till 1952.

The Five year plans of India that commenced during this time placed very high importance on building large reservoirs as a measure for flood control, power generation and growing more food crops. A strong engineering bureaucracy that already existed in the state was given a responsibility of planning and reservoir building. More than others, the bureaucracy themselves had become a votary for Vaigai reservoir project. The ideas of Ryves was thus revived and gained momentum because of the same social reasons cited in Periyar project.

Social reasoning for the reservoir

Since the days of the British, the belief about irrigation solving the problem of violent tribes in the country was strong. As Francis judged, "The department of Public Works may soon be able to claim that it has succeeded where the army, the police and the magistracy have failed, and made an honest man of the notorious *Kallan* (Francis 1906, 1:93)". This was the same social reasoning given to this new reservoir project. *Pirmalaikkallar*, a sub caste among *kallars* lived in the region between Suruliyar junction and Peranai *anicut,* a 60 km stretch did not get similar benefit as their fellow caste men got in Melur Taluk under Periyar project. Being located geographically in the upper reaches, they nursed a grievance that they were left out in development. The Collector of Madurai in 1950 said,

> In reviving this [originally conceived by Horsley and Ryves] scheme, one of the ideas was that it should give benefit to the backward areas in *Kallarnad* [the land of *Kallars*] and thereby improve the economic condition of the *Kallars* and wean them away from crime, in the same way as the main Periyar project was intended to reform the turbulent criminal classes in Melur Taluk of those days (District Collector, Madurai 1950, 4).

The argument was that when Melur and Madurai Taluks could be reformed as Francis judged, why not to do the same in the upper reaches. The sanctioned project of 1952 stated,

> The areas to the south of the river below Peranai regulator, particularly in Thirumangalam Taluk limits, where the *Kallar* population is predominant are in dire need of proper irrigation facilities being provided for the tract…If Melur Taluk dominated by the *Kallar* community deserved the use of Periyar water to lift them up and wean them away from their age-long thieving propensities, Thirumangalam Taluk equally if not more necessarily requires river water being made available to them to better their lot (PWD 1952).

All usual financial disciplines and conditions imposed during the British rule were given up and replaced by this social reasoning. After 1947, a cash starved India had in theory got strict criteria to evaluate projects. However, a major reservoir of regional importance like Vaigai reservoir was approved even when the strict financial criteria were not met. A minimum of Return on Investment (ROI) of 2 % was required as a government norm for any project to be considered for approval. Even though the project was expected to serve a meagre area of 11,000 *ac* of lands, the financial criteria was waived saying the project was to benefit a tribe of *Kallars*, and help a de-notified community[55]. Similar areas, but smaller irrigation schemes in Malabar (Kerala) with considerable benefits were rejected on the same financial grounds that they had a poor ROI (Madras Assembly Secretariat, unknown:212).

Even though the plan period had already commenced in 1951, well before the approval of this project, it was backdated and deemed to have commenced

[55] The colonial government using special laws had a policy of declaring certain castes that were alleged to be involved in dacoity, thievery and other such criminal acts as de-notified communities. Those castes were monitored by the police and revenue administration closely for their movement. In some situation, the adults belonging to these castes need to report to the nearest police stations regularly. Kallars were one among these de-notified castes lived in the Madras presidency areas. Local history of Kallars in Vaigai region are available in Sundara Vandiyathevan (2012).

during the first five year plan. The minister for the Public Works, who was just brought in for the job, came from the family of Ramnad *zamindari* where people were protesting against the project. He used his personal and feudal influence to restrain the protestors from his area. The power of engineers to plan for large sized reservoirs, their supposed professionalism when combined with the persuasive power of politicians from feudal families made the Vaigai reservoir possible.

Vaigai reservoir: For and against - the discussions

In 1942, the reservoir was titled as a 'subsidiary' to Periyar reservoir and the storage was set at 2,500 Mcft [70.79 Cum]. By 1944, the size was increased to 7,000 Mcft [198.22 Cum], almost three times. The final proposal in 1948 made by E.V.Narayanan, a prominent engineer of his times, set it as 6000 Mcft [169.90 Cum]. The project aimed to irrigate 12,000 *ac*, and stabilize hard cases[56] of 5,000 *ac*. Additional reasons were found for considering a very small area of 12,000 *ac* for such a massive reservoir: electricity generation. Again, the electricity generation did not need big storage *per se* but combined with the additional water to be drawn from Periyar reservoir a reasonable argument was made. Now, the objectives became threefold:

i. To allow water to be drawn from the Periyar lake either from hydro-electric generation or from normal supplies and then impound it in Vaigai reservoir;
ii. To utilize the surpluses of the Periyar river that flows unused and wasted into the Arabian sea;
iii. To impound a portion of Vaigai flows when the river surpluses reaches the sea.

[56] Hard cases refer to areas that were left out of irrigation for some reasons in an irrigated stretch. The reasons could be due to poor alignment of canals due to undulations or mounds or restriction of spaces to route the canals.

(PWD 1952)

In the following discussions, we will see how all these objectives are unjustified and were detrimental to the tanks in the LVR. Objective (i) and (ii) were based on Periyar waters and the beneficiaries of Periyar have no reason to object rather it benefits them. However, objective (iii) affected the traditional Vaigai tanks lying far away from the reservoir in the erstwhile *zamindari* areas of Ramanathapuram and Sivaganga. They objected by saying their waters should not be stopped in the reservoir.

Objections from Ramnad[57] *Ryot*s

LVR ryots were apprehensive of the size, location and the procedural arrangements of the proposed Vaigai reservoir. We need to recall the total capacities of all tanks below Peranai amounted to 11,000 MCft [311.49 Mcum] and received their supplies from the catchment above Peranai. Anything done to store above Peranai directly affected them and hence a size of 6000 MCft [169.90 Cum] and the location at Andypatty were objected.

Other salient objections by the *ryots* of Ramnad (LVR farmers) are summarized here[58],

i. Stored water in Vaigai reservoir loses its nutrient quality and consequent siltation occurs in the reservoir
ii. Very small area of 11,000 *ac* benefitted in relation to an investment of more than Rs 20 Millions, is a disproportionate investment.

[57] After the transfer of power, Ramnad district was formed by merging the former *zamindaris* of Sivaganga and Ramnad. Hence, Ramnad indicates the areas including Sivaganga and Ramanathapuram districts.

[58] Translated from the petition made in 1950 by the (Ryots of Ramnad 1950). An extended summary of their objections from a petition made by them is given in annexure - 6.

iii. Poor return on investment (ROI) of 1 %, alternatively if invested in tank related works in Ramnad may yield much more.

iv. There were more backward areas in Ramnad that need development compared to the proposed Thirumangalam Taluk.

v. Vaigai is used more in the upstream areas leading to regional imbalances within a basin.

vi. A dam benefitting a small area of 11,000 *ac* of irrigation submerged 5,700 ac.

vii. Water accounting becomes too complex and affect the customary use of the river flows.

viii. There is no surplus in Vaigai and all the estimations about the surplus are doubtful and unreliable.

ix. Previous court ruling (in Fischer's suit) was against the interests of LVR farmers and already waters of LVR are appropriated using Peranai modifications.

x. Bureaucratic procedures will be difficult to implement and may complicate and control the river flows.

xi. Alternate storages of the same size (6,000 Mcft [169.90 Cum] or more) can be easily achieved through developing the existing decentralised tanks at a fraction of the cost without having the reservoir.

Though the farmer's petitions did not have any elaborate arguments it did convey the message that centralized reservoirs will be detrimental, bureaucracy will be misused, water accounting will be cumbersome and unwarranted and above all the design and location of dam was faulty.

Objections from the Collector of Ramanathapuram

The district had just been brought into the government land revenue administration system after the transfer of power from British. The process of converting the *zamindari* settlement into *ryotwari* settlement was still under way. Hence, as a first step, a proper survey of villages that would benefit from by

Vaigai was to be undertaken. Such a survey took several years and by the time it was completed the reservoir project was completed and became operational.

In May 1950, the Board of Revenue requested that the actual area fed by Vaigai in Ramanathapuram district; quantity of water required for the area; the quantity of water let down in the River below Peranai; and the quantity of water to be let down every month once the reservoir was built were determined. This was not done. Also the district food production committee objected to any projects in Vaigai fearing their waters would be reduced (District Collector, Ramanathapuram 1950).

Hence, without even knowing the actual area served by Vaigai in the erstwhile *zamindari* areas the opposition to the project was overruled by the Madras government. The final project proposal for the Vaigai reservoir project mentioned,

> The total area of irrigation served by the river below this regulator is 114,000 *ac* served by 96 river channels feeding 234 tanks, out of which 66 tanks with an *ayacut* of 32,790 *ac* and 50 tanks (the details of *ayacut* of which are not definitely known) in Sivaganga estate limits and 67 tanks with an aggregate *ayacut* of 24,033 *ac* in *Ramnad Samasthanam* have to be specifically made mention of. (PWD 1952, 7)[59].

This figure of 114,000 ac was contested even by the newly formed engineering divisions in Ramanathapuram District, which estimated an approximate area of 200,000 *ac* based on farmers' protests and petitions. It would not have been impossible task for the engineering bureaucracy to ascertain the area benefitting from LVR. It would have been possible to verify *zamindari* and other colonial

[59] These figures included only the directly linked channels of Vaigai. It did not include areas beyond these channels. In the same way, it ignored the inter-basin transfers of waters from Vaigai to Gundar and Saruganiyar.

records. However, a figure prepared during colonial times by the Madras PWD was declared final.

Collector of Madurai

District Collector of Madurai[60], who was likely to benefit from the new reservoir also sent reports indicating the areas under Old Vaigai channels in Ramnad district are conflicting. In one such report dated 11.4.50, he discussed the 'handicaps of water shortages in the river'. The officer listed the potential conflicts this reservoir proposal might lead to:

> Connected with the availability of water is the question whether the construction of the dam will affect adversely the riparian owners lower down the Vaigai below the reservoir and the existing regulator at Peranai. The apprehension, whether *ill-founded or well founded*, that it will so affect, has given rise to much agitation especially in Ramnad district (District Collector, Madurai 1950, 3) (emphasis added).

The fears of the *ryot*s about the new reservoir were well founded.

The Collector of Madurai though doubted that the tank irrigated areas benefitted by Vaigai channels in the *zamindaris* was 200,000 ac. He conceded it was more than estimated in the proposal and agreed it would be around 150,000 *ac* or less. We need to recall the area benefitted by Vaigai remained always a question even during the times of Fischer's suit[61]. No one had any data. The British government did not need to have data of this nature for a *zamindari* because their taxes do not depend on such calculations[62].

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[60] At this time, the district Collectorate of Ramnad including Sivaganga was kept at Madurai a few metres away from the Madurai Collectors' office.

[61] *Robert Fischer v Secretary of state [1908] 2 Ind Cas 325*

[62] In *Zamindari* areas the land revenue was a fixed amount collected from the *zamindars* as per the land settlements made to them. Improving irrigation systems is a responsibility of *zamindars,* and even when there is any incidental benefit realized by *zamindars* due to improvements done elsewhere in the *ryotwaris* cannot be charged to the *zamindars*. Therefore, the government has no

The newly setup PWD division for Ramanathapuram district claimed the area benefitted by Vaigai was around 200,000 *ac* in its statement to the Board of Revenue. However that was not used by the project planners rather they adopted the data of the Pre-Independence times and set it as 114,000 ac. This data belonged to the time of Fischer's suit.

Fearing the consequences of capturing the water belonging to Ramnad, the Collector of Madurai took a neutral stand and said waters due for LVR should not be touched. He wanted the project to drop the idea of having surplus in Vaigai altogether. He wrote:

> Whether the total area is two lakh (200,000) *ac* or a little less than a lakh and half (150,000) *ac* is not very material. It is obvious that the new scheme should not reduce the quantity of water available for this existing irrigation. This point requires special emphasis because the area affected lies mainly in Ramnad district, a district which is already highly deficit in the matter of food production (District Collector, Madurai 1950, 3).

He also fore-warned about making any unsupportable claims of 'bringing new and additional water' by writing,

> In some places in the scheme report, the Executive engineer (of Madurai) himself speaks as if the Vaigai surplus may also be available. The *ryots* (of Ramnad) feel that in actual practice a portion of the Vaigai surplus to which they are entitled to will go to the new *ayacut* in Thirumangalam Taluk. If however an authoritative assurance is given to these *ryots* from the technical as well as the administrative side on this point, all these objections are likely to be withdrawn and there will be no legal impediment to the execution of the scheme (District Collector, Madurai 1950, 4).

The claims of surplus were very common in many engineering documents and typical since the days of Horsley and Ryves. Anticipating conflicts that might reach the courts delaying the project altogether he said,

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incentive to involve in irrigation improvements in *zamindaris*. Refer to previous discussions made in chapter 4 on Urlam case laws.

> In fact, it is clear that any scheme which will reduce the supply available in the Vaigai will lead to litigation and complications. Till recently, the Government were not directly concerned with the *zamindari* areas in Ramnad, but with the taking over of the *zamindaris* in that district, the Government have become directly interested in safeguarding the interests of those *ryots* (District Collector, Madurai 1950, 2).

At this stage, a few more modifications to the project were made by including a few more poorer villages of *Pirmalaikkallar* castes and few other villages located on the banks of the proposed canals. The department feared, if the design by-passed them they might steal water or cause damages to the entire scheme. Overall, the project when completed expected to result in producing an additional paddy yield of 6,053 tons.

Madurai Collector once again raised a question over the need for the huge size of the proposed reservoir and wanted it to be reconsidered again.

His concern was from the tanks that benefitted from Periyar in the upper Vaigai regions of the Cumbum valley. The proposed size was a concern to the upper Vaigai villages in Cumbum valley also. Villagers in the head reaches thought the entire waters from Periyar might be drained to store in the reservoir below them and putting their benefits from Periyar at risk. Periyar water entered their territory first and they were given a privileged treatment of double cropping by sustained running water in their rivers for more than six months (District Collector, Madurai 1950). However the PWD did not agree with reducing the size of the reservoir.

Responses from PWD

Answering to all the queries and doubts raised in the previous sections by the *ryots* of Ramnad and the Collector of Madurai, E.V.Narayanan, the engineer who investigated the scheme, reassuringly wrote, "the following special features of the project may be taken *as settled* (Narayanan 1950b)". The settled features, according to him were:

> 1. No flows in the Vaigai River are proposed to be impounded at all in the new reservoir; the *status quo* regarding utilizing Vaigai river flows will be strictly maintained;
>
> 2. The storage in the Periyar lake is proposed to be drawn out at all times in the year to the maximum capacity of the Periyar tunnel. After meeting the demands of Cumbum valley irrigation the rest will be stored in the new reservoir. This water will serve hard cases [left out areas] up to 5,000 *ac* within the Periyar irrigation and 12,000 *ac* of new irrigation (Narayanan 1950b).

The doubts about the need for such a big storage space lingered even among other engineers within the Department. M.K.Narambunatha Pillai, Executive Engineer of Periyar Division formally wrote asking for a copy of the project report from his Chief Engineer in Madras to verify what is final? He asked his counterparts in the investigation wing who designed the dam, *to confirm or deny his understanding.* He wrote,

> As far as certain conferences in which the Special Executive engineer broadly explained the features of the scheme, I understood that the reservoir will only impound that quantity of water which now goes to waste to the Arabian Sea through the surplus regulator of the Periyar Lake. If I have correctly understood his proposals, I should think that Vaigai catchment flows will pass down the reservoir as hitherto and that no existing interest in Manamadurai, Paramakudi and other areas in Ramnad district are likely to be affected to any extent in any manner (Narambunatha Pillai 1950).

E.V.Narayanan replied, “it is too just that not a drop of water from the river should even be dreamt of being utilized in the new reservoir (Narayanan 1950a)”. This is how the PWD formally dropped the notion of surplus repeated since the days of Ryves. He suggested not to reduce the size of reservoir but to have a new management or accounting mechanism to ensure that not a drop of water meant for LVR tanks was usurped. The project did discuss the inter-basin ‘transfer of water to Gundar River basin’ citing a seventh century A.D inscription of Pandiyan origin in the introductory chapter. But this historic transfer was used to create the new irrigation areas under the project but not to strengthen the historic arrangements. No mechanisms were suggested to safeguard those customary users in adjoining basins.

The scheme, assurances and management mechanisms

The dam was built entirely based on objectives 1 and 2 that depended on waters solely coming from Periyar. When the construction of the reservoir commenced, it had the following objectives[63]:

i. To divert only Periyar flows that flows unused wasted into Arabian sea;
ii. That only Periyar supply will be impounded;
iii. The reservoir capacity was to be 4,000 Mcft [113.27 Cum] in the 1st stage and rising to 6,000 Mcft [169.90 Cum] in the 2nd stage. The shift from stage 1 to 2 was decided after watching the functioning of the present project for some years[64];
iv. supplies from the reservoir[65] were to be released through a 22.5 miles long canal directly to Peranai and hence the river was not been used by Periyar areas;
v. The cost of the scheme was to be Rs 228.5 lakh and the returns estimated at 1.14 % on the works outlay and 1.05 % on the gross outlay

[63] Endorsement no. 5619/51. D1 dated 2nd January 1952 from Chief Engineer (Irrigation), PWD, Madras. (Venkatachari 1952, 1)

[64] The project did not mention any specific time but a reasonable guess could be at least one hydrologic cycle of 12 years.

[65] The final sanctioned project was to benefit (i) Periyar delta – 3,000 *ac* of hard cases; (ii) Thirumangalam Taluk – 12,000 *ac*; (iii) Sivaganga Taluk 5,000 *ac*. The total area climbed now to 20,000 ac from 12,000 ac. The project was presented as irrigation cum hydroelectric project and the cost of head works shared between irrigation and electricity departments (PWD 1954).

When completed in 1959, the above objectives (i) and (ii) were not followed. The reservoir had storage of 6,800 MCft [192.55 Cum] as against 4000 Mcft [113.27 Cum]. The dam was built in one go- non-stop as against any watching period suggested. There was no monitoring of performance between stage 1 and 2. In the final analysis, the utilization of Periyar floods became the sole purpose achieved by the project.

Again, this could not materialize because of the issues with the Periyar agreement of 1886. The hydal power station in Periyar needed permissions from the Kerala government. They were not forthcoming to make any changes in the agreements of 1886 and Kerala even objected to make any modifications in the Periyar dam.

So, the only option was to use the Periyar waters was to enlarge the tunnel so that they could pass down waters as quickly as they can to Vaigai. Even if that happens this change would not yield any big amount of water as specified in Vaigai project proposal. Let us see why?

The estimated quantity of surplus water that goes into the sea from Periyar reservoir was 8,932 Mcft (Mohanakrishnan 1997). This estimate was based on the average surplus flows for a period of twenty two years between 1919 and 1940. Within that period for 13 years the flow was lower than the average and of this, for six years there were no flows at all. For the remaining nine years, there were real flows. This data shows that the proposed reservoir would get waters from Periyar only in three out of seven years, and at other times the proposed reservoir will remain empty. Thus, every assumption made and, action done was just the opposite of what was told to the people of LVR. This shall be seen below at some length.

Political assurances

The protests of the LVR farmers came into the open, petitions sent and protestations held. In order to persuade the LVR farmers the influence of Shanmugha Rajeswara Naganatha Sethupathy, (alias the erstwhile *zamindar* of Ramnad), was used by the government. He was an elected member of the first legislative assembly (1952-57) from his erstwhile *zamindari* areas. He was made the minister of Public Works as the protests gained momentum. As a leader claiming allegiance to the welfare of his own people (of Ramnad) he made visits to Ramnad, met with protesting groups in order to pacify them.

The protests reached the Madras legislative assembly also. When the financial proposals were debated a 'cut motion' was launched against Vaigai reservoir on various grounds that included poor returns for such a massive project when other areas in the state were languishing in chronic and severe drought. The minister made the following assurance,

> Hon. Members should remember that I represent the constituency of Ramanathapuram and as such I would be fully alive to the needs of my area. If hon. Members are not able to believe my words, I cannot help it. Let them hear the views of the engineers in charge of 'Vaigai' scheme. The Engineers would testify that it is not proposed to divert the course of the Vaigai River at all. They propose during the season when Periyar canals remain closed down, draw 4,000 Million cubic feet of water from the Periyar river and then to implement the scheme. I would like to assure the hon. members that the Engineers will keep a clear account of every drop of water that will flow through Vaigai during floods and at other times. Therefore, let not the agriculturists of Ramanathapuram, Paramakudi and Manamadurai [towns in LVR] feel that they would suffer by the coming into being of this Vaigai scheme[66].

The cut motion was withdrawn on this assurance and the finances were approved. The protests did not die down however. The government issued a press release[67] which was publicized widely in the protesting towns and villages. The press release of December 1954 said,

> No part of the natural flows in the Vaigai River that were hitherto flowing past the Peranai *anicut* will be impounded in the reservoir. They will merely be passed down the river, through the river sluices that will be

[66] Page 547, Proceedings of the First Legislative Assembly (1952-57) dated 22.12.1953.

[67] Press note 79, dated 15th December 1954 from government of Madras, Public (Information and Publicity) Department.

> provided in the new dam. The capacity of the new sluices will be large enough to pass all Vaigai flow which will normally suffice to meet the demands of the several channels taking off from Vaigai.
>
> If, however, any floods exceeding such capacity occur, and consequently have to be held back in the reservoir, they will be passed down immediately after the peak floods. For this purpose the capacity of the reservoir has been increased from 4,000 Mcft [113.27 Cum] to 6,800 Mcft [192.55 Cum] (Mohanakrishnan 1997, 137).

By saying this, the government justified the increase in the capacity of reservoir for which financial approvals were made in the legislative assembly.

Technical and management proposals

Everything now boiled down to have a techno-managerial mechanism system to run and manage the reservoir. The technical measures included separate channels on both sides of the river Vaigai and hence the Periyar flows will never go through the river as happened in the past. In theory, this may not affect the flows meant for LVR.

But the critical issue was water from both Periyar and Vaigai to be stored in one place. Hence the water accounting rules became crucial. These rules included (i) opening an accounting procedure to compute and record flows from Vaigai and Periyar rivers separately and (ii) deliver the measured quantities to the respective areas. The techno-managerial administration was held by the PWD at a single division called Periyar-Vaigai basin. Through these measures, the government tried to show perceived neutrality.

Respect for customary rights and evaluating Periyar rules

This section argues there always existed a bias against the traditional tanks that lie in a decentralised environment in LVR to the benefit of the highly centralized Periyar command areas. The new rules of managing the river, dam and channel networks were done in that manner ever since planning and execution of Vaigai reservoir commenced. As part of the project, a meeting to revise the working tables of water availability in Periyar reservoir was organized. The meeting acknowledged the extraordinary efficiency of the entire Vaigai system throughout the history. The participants included all the engineering bureaucracy who designed the dam. The meeting recorded,

> Due to juxtaposition of such tanks spread over the whole delta particularly at the tail end of the system, not a single drop of water is being wasted, and it may be stated that in fact in this delta the maximum of irrigated area is benefited for every cusec of canal water in this state (Narayanan and Kumaraswamy 1952, 5).

However, their glorification of customary and traditional Vaigai system was without any value. The participant engineers questioned the 'clamour' of usurping traditional Vaigai flows by raising a counter question of which custom is important and relevant?,

> …..whether the present clamour of the Ramnad district *ryots* under the rainfed tanks originally under the control of *zamindaris* and *inamdars* and fed by the Vaigai river below the Peranai regulator to the tune of nearly two lakh *ac* right down to the sea, **has to be heeded now to the detriment of the mamool [customary] usage of the Vaigai waters for over 5 decades to supplement Periyar delta supply**" (emphasis added) (Narayanan and Kumaraswamy 1952, 5).

The use of Periyar water and their alleged over extraction in the upper reaches were also made into a CUSTOMARY use. The customary use of over a millennium by hundreds of tanks became less important to the newly arrived Periyar, just five decades previously. In a way, the discussants felt that they did not need to worry about the historic systems because Periyar has also got a new history and associated customary right with it.

It has to be noted that the man who led the meeting Er. E.V.Narayanan, was known for his technical acumen and revered by many engineers for his extraordinary work on dam investigations in the state[68]. He was a party in the

[68] Based on personal discussions with S.M.Ratnavel, retired chief engineer of PWD.

investigations for building Vaigai reservoir and stood for building many other dams in the state. For him, the historical use of the river Vaigai for centuries by lower Vaigai did not appear weightier as compared to the recent past fifty years of the Periyar scheme.

The discussants answered, "No useful purpose will be served by changing the present practice, and raking up age-long practices (Narayanan and Kumaraswamy 1952, 5)". So, thereby age-long practices were negated in front of the newly arrived projects. The 'clamouring parties' were under a *zamindari* regime and they are not a big political force to lobby or give a fight. The meeting decided to ignore the historic custom against the recent usage.

The meeting finalized the accounting procedures for water to be followed when the Vaigai Reservoir commenced. According to this, the amount of water that could be stored in this reservoir could be ascertained from the following daily data:

- release of water from Periyar head sluice at Thekkadi
- requirement of water for the Cumbum valley
- release of water in Thirumangalam canal and into the river (from Vaigai reservoir)
- arrivals at Vaigai reservoir
- amount of water released below Peranai (to Periyar areas)

Obviously, tracking these details on a daily basis would be not only tedious and expensive, but also impossible for the Ramnad farmers who felt everything is going wrong for them in Vaigai related projects. They have to accept the details provided by the PWD. Even accepting the theoretical possibility of such a mechanism working fairly, how to oversee and act upon on a day to day basis would be unthinkable and complex. Look at the datasets that involved in computing the flows in the river.

Datasets

Data set 1: Daily tunnel discharge at the Periyar Lake and quantify volumes on daily basis

Data set 2: Discharge measurement at Palanichettiyapatti *anicut* across Suruliyar and quantify volumes on daily basis.

Data set 3: Daily storage measurement at Vaigai reservoir.

Computations

Periyar credit = Dataset 1 minus Dataset 2.

Vaigai credit = Dataset 3 minus Periyar credit.

The readings were to be taken on a daily basis, and the computations were to be done on a fortnightly basis.

The respective credits will be kept in the custody of the Executive Engineer who will have the jurisdiction over entire Periyar-Vaigai command and his office is at Madurai.

Vaigai credit would be let in the river below Peranai and announcements would be made through newspaper and radio about its time and date.

The PWD rule book for water regulation[69] in Vaigai brought another issue that, total basin flows have to be computed from the areas below Suruliyaru River. The

[69] "Rule 28: Irrespective of the storage position of Ramnad big tank, impounding of Vaigai flows, either natural flows or flood flows, shall be made for such periods at any time as considered necessary by the Executive Engineer, Periyar Vaigai division vide rule 29. Note: (i) the flows passing down the Palanichettipatti *anicut* across the Suruliyar and recorded daily at 4.00 am, 8 am, 12.00 noon, 4 p.m., 8 p.m. and midnight shall be deemed Periyar waters. (ii) till the construction of the measuring weir across the river Vaigai, the total inflow into the Vaigai reservoir computed from the water level in the Reservoir, less the Periyar inflow shall be deemed as the natural inflow of the river at Vaigai Reservoir site" (Chief Engineer, Irrigation 1984a, 208)

inference is the area above that point now becomes Periyar flows even though it technically belonged to Vaigai[70]. According to Ratnavel, who was then the Superintending Engineer in Sivagangai circle in the late 1980s, a loss occurred to LVR every year due to this rule since 1959.

According to him, from 1965-1979 the loss of waters to LVR amounted to an average of 2,150 Mcft [60.88 Cum] per year. This quantity would be enough to cultivate a successful crop of not less than 25,800 *ac* (Ratnavel 1998, 6). This resulted in reducing the dependability of lower Vaigai tanks from 57.7 % in 1952 to 35.7 % in 1975 (Ratnavel 1998). This would mean that all the lower down tanks in Ramnad and Sivaganga would be filled successfully using Vaigai only in 11 out of 20 years. This situation remained the same until 2002 for which data was analyzed by Ratnavel and was accepted by the department (Chief Engineer Madurai Region 2006a) and formed the basis for amending the rules[71] in 2010.

Of course, the falling dependability is not only due to the rules of measurement and calculations alone but also due to the establishment of medium reservoirs and extension of Periyar areas in the name of modernization and technology improvement projects done between 1959 and 2005.

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[70] This rule is against the understanding in the Periyar project proposal that said the farmers in Cumbum valley shall take *as much as water they needed from Periyar.* The final approval note of the project prepared by Colonel J.O. Hasted, R.E, Acting Chief Engineer for Irrigation said, "After much consideration it was decided that water now thrown into the Sooroolly [Suruliyar] and Vigay [Vaigai] should be passed round the existing *anicut*s and not over them. *It is to be noticed that all these anicuts [in Cumbum valley] supply Government land exclusively, and that therefore there is no reason to anticipate difficulty from interference with the existing supply…* (Pennycuick 1886, 73)" (Emphasis added)

[71] G.O No.122 dated 21.04.2010 issued by Principal Secretary, WRO-PWD, Government of Tamil Nadu on amending the Rules of Reservoirs.

Medium reservoirs and their consequences

Three new reservoirs were built (**Table 7.3**) in three tributaries and they had two purposes in common. They aimed to stabilize the existing *ayacut* in the tanks fed by them, and bring in additional *ayacut* through the projected surpluses. In order to achieve this the free flowing tributaries were stopped. More importantly their waters were stored in the head reaches and released in a controlled manner by the PWD.

Table 7.3. Major and Medium reservoirs in Vaigai basin

Sl. No.	Name of the reservoir	Capacity in Mcft	Capacity in Mcum	Old areas under tanks in ac	New areas in ac
1	Manjalaru (1967)	487	13.79	3,249	2,000
2	Marudhanathi (1979)	187	5.30	2,356	4,151
3	Sathaiyar (1965)	56	1.59	1,087	412
	Total	**730**	**20.68**	**6,692**	**6,563**

Note:

(i) Out of the 3,249 ac [1300 ha] of old *ayacut* 897 ac [359 ha] are double cropped and the rest single cropped.

Source: (Chief Engineer 1984, 218), (Chief Engineer, Irrigation 1984b) (Chief Engineer, Irrigation 1984c, 227)

Each of these three reservoirs was contested by the pre-existing tank users in the respective sub-basins and also by Ramnad *ryot*s. In Manjalaru reservoir there were nine tanks fed by nine ancient *anicut*. A new canal of 8 km length on the right flank of the dam was formed to benefit the new areas (PWD undated). Within two years of its completion, the PWD stopped the release of water to old areas, which resulted in a long running court case of twenty five years. In

Marudhanathi reservoir (1979) the old areas are served through sending water in the river bed and the new areas through new channels. The reservoir started storing all the flows from the entire catchment of 53.35 sq.km, affecting the existing tanks. The protests to the dam building process were very similar to Manjalar about the size, location and beneficiaries of the reservoir. In Sathaiyar Odai reservoir (1965), the 22 km long stream that was feeding ten tanks was blocked. The reservoir was built to 'stabilize' the existing areas and new areas under direct *ayacut*. The new *ayacut* is closer to the reservoir and the tanks are spread over a 10 km stretch. The reservoir was built at a place where it could collect 2/3rd of the catchment flows.

Continued extension in upper Vaigai

The reservoir construction did not stop at these medium sized reservoirs but continued to expand based on new claims of utilizing peak flood flows in Vaigai. In Cumbum valley in the upper Vaigai, two new canals named P.T.Rajan canal (1978), Thanthai Periyar canal (1984) were excavated to feed an additional area of 5,146 *ac*. Works on another channel named 18th channel (*Pathinettan Kaal*) commenced in 1999 to feed 36 tanks. It was not known how and when the supplies would begin. The channel was ready in 2011, but supplies are yet to start even in 2012[72]. In 1993, another project, '58 village scheme', with a financial approval of Rs 338.1 Million to supply water to 32 tanks in Usilampatti Taluk commenced. Though it was intended to start its water supply in 2012, there is no trace of its functioning. The department[73] stated supplies to the 58 villages scheme will be subject to two conditions: (i) Vaigai river must surplus into the sea; (ii) the Vaigai dam has to have more than 2800 Mcft [79.28 Mcum] as Vaigai credit. This had not happened until 2012 and water is yet to flow to this scheme. Since 2006, several bed dams are being constructed to harvest and utilize the

[72] Based on field visits in February 2011 and enquiries made in June 2012.

[73] Based on field visits in February 2012 and enquiries made in June 2013.

underground springs. The purpose is stated to be to ‘replenish the ground water’. This is in contrast to the numerous spring channels taking off from the river during Fischer’s case. My visits in 2010, 2011, and 2012 showed the river has no sign of any spring channel anywhere and no subterranean flows in any of Vaigai fed channels. Apart from these projects, there are another four proposals in various stages of preparation in Thirumangalam and Usilampatti Taluks[74]. In short, several schemes are planned to use the ‘surplus' waters of Vaigai.

Reduction of Flows to Lower Vaigai

Going by the water conflicts that are expressed in the form of local protests, petitions and court cases, the availability of any surpluses in the tributaries as well as in Vaigai remained doubtful. This is re-confirmed by a study done in 2003 by the Anna University. The study analyzed the available historic data related to water releases and floods and concluded that the total water that was flowing below Peranai had decreased by 40 % when the annual averages for the period between (1941-55) were compared with (1986-2000). Apart from other reasons, such a big reduction was attributed to the completion of three medium-sized reservoirs and the continued abstraction of water in Periyar areas at Peranai regulator (CWR 2003).

Conflicts in medium reservoirs – Manjalar

In June 1969, within two years of the reservoir coming into operation, the problems of water distribution started. The government passed orders regulating the supply of river water through both new and old *ayacut*s to different villages under a newly created turn system. Turn systems are rotational water supplies that may ensure equity during water scarce periods. This sort of regulation is an

[74] A bed dam near Cholavandhan village near Chitranai is completed in 2010, and expected to recharge ground water in the neighbouring drinking water wells. There are five such bed dams are planned in the river to augment ground water. Discussion with the Assistant engineer, Thirumangalam Section in January 2011.

administrative control of the river water to which the old users objected, in Butlagundu and Kanavoipatti villages which used to be double cropped areas. The traditional users have pre-existing rights to use the entire water flowing in the river when the dam did not exist. The dispute reached the Sub-court in 1971 when these villages were denied water for their second crop. The PWD claimed that there is no sufficient water in the reservoir, but that was not true. Also they claimed the department is not obliged to release water for the second crop since they did not recognize double cropped areas under the project. This again was also not true. On the contrary, these villages were paying a betterment levy[75] for the dam construction in addition to their regular tax on top of the revised land and water cess for double crops.

During the trial, the department admitted to both reasons being not true. However, it said that when the scheme was taken up for investigation and implementation, the existence of double crop lands in the old *ayacut* was not taken into account for the provision of irrigation. For such a omission by the department, it received 'no objection from any one to the construction of the reservoir at that stage with that assumption'. As in Fischer's suit, it argued that these two villages have no right to question the 'prerogative right of the state to regulate and divert waters flowing in natural streams'; and wanted them to show a 'positive proof of damage[76] or serious loss'.

[75] Betterment levy is charged whenever a new scheme brings irrigation to a dry land. On some occasions like Manjalar, this is charged because additional water is offered through the scheme.

[76] Positive proof of damage in this case is the loss of irrigation. It is very difficult to prove in systems like tanks that have their own independent catchments and combined catchments (including water drawn from the river). Even if there is no water released from the river the tanks would have got some water from their independent catchment. Even though the water is not adequate, many farmers would still go for cultivation may be with the use of wells. Hence the PWD claims that by not releasing water they did not stop cultivation. The same discussion happened in the Fischer's suit and the court did not agree with Fischer's claim of not receiving water from the river as before.

Unlike Fischer's suit, the case involved only two villages that are close to the dam, and they could prove all that the government (PWD) said in court was wrong. Hence, the district court ruled[77] based on facts that the PWD cannot divert the water that belongs to the customary users to be stored without feeding them first. The court allowed the PWD to do so only after fulfilling the customary user's needs as per the existing law. The verdict had serious bearing on the working of the dam, and it became a challenge to the authority of the very existence of the technical department. Many irrigation projects could face similar problems if the verdict stood. So, the government appealed to the High Court, and a single judge concurred with the district court; the appeal was again dismissed in favour of the villagers.

The government made a second appeal and the case went to a bench consisting of two judges of the Madras High Court[78]. The government brought in new and novel grounds:

1) The state has prerogative right to collect, store and regulate water supply in flowing rivers, streams with an intention of redistribution.
2) The interference by the Government with the existing rights of irrigation from artificial channels constructed by Government is not an actionable wrong and the *ryotwari* proprietor is not entitled to insist that the entire volume of water which had been flowing through the artificial channel should, for all times, be allowed to run along the channel without diminution or diversion by the Government.
3) With the development of the concept of 'Law and Justice', the feudal principles or theory of "Laissez Faire" are yielding to a "Socialistic" pattern of society and the government's action is based on those principles of social and distributive justice.

[77] *Abdul Karim v The District Collector of Madurai, O.S.No. 327 of 1971*, Madurai District Sub-Court in Dindigul.

[78] *State Of Tamil Nadu v A.Abdul Karim, [1997] 2 MLJ 261*

4) Art.39(b)[79] of the Constitution of India enjoins the State also to direct its policy towards securing that the ownership and control of the material resources of the community are so distributed as best to serve the common good and the words material resources' have been assigned wide meaning to include not only natural but also manmade resources.
5) The paramount and absolute rights of the State government to regulate and distribute the supply of water for irrigation cannot be whittled down or undermined by the Civil Courts granting any blanket order of injunction or stay or even any direction or declaration annulling a particular scheme or project devised in the larger and general interest and welfare of people and the society at large.

The first two arguments were known and upheld by the courts in previous cases in different circumstances. However even in such disputes, the government still needed to safeguard the customary rights under the *Indian Easements Act 1882*.

Arguments 3-5 were new. Equating ordinary tank farmers who are mostly small and medium farmers as if they were feudal lords was unknown and unheard of. Also, in this case, there was custom, customary right and usage that was recognized by the law, recorded in government revenue records and also admitted by the courts. The litigating villagers were not known to have any vast stretches of lands under their control.

Even then, the High Court agreed with the government and said the government action amounted to redistribution of water. Taking away water from the existing double crop users and offering it to dry land holders in the neighbouring villages amounted to 'socialism and redistributive justice' according to the court.

[79] The provisions of the Directive principles of state Policy (Articles 36-51) shall not be enforceable by any court, but the principles therein laid down are nevertheless fundamental in the governance of the country and it shall be the duty of the State to apply these principles in making laws.

Also by agreeing with the point 5 the Judgement took away an entire jurisdiction of district courts in determining the correctness of any government action at local levels. One of the powers of the lower courts in resolving civil disputes of this nature and issuing injunctions to projects done by government was also summarily taken away from them. The consequence of the judgement was that lower courts stopped entertaining such pleas on several occasions.[80] If the government claimed its water development 'project is devised in the larger, general interest & welfare of the people and society at large', the lower courts will not entertain opposing pleas from anyone. The court thus gave virtual monopoly to the government in determining their actions with respect to irrigation development. Thillai Gvindan, a senior citizen and a farmer leader from the area equated the process of dam building as 'hitting them below the belt[81]'.

Though this case is about a smaller part of the Vaigai basin, it is discussed here to indicate how courts and law view such government actions controlling the rivers without minding traditional systems. Beyond the sub-basin, the conflict also had some effects on the LVR because the new areas had reduced the flows that would reach LVR through the existence of the dam.

7.6 PART V MODERNIZATION PROGRAMMES IN VAIGAI (1969-95) AND DESTABILIZING THE RIVER AND TANK NETWORK IN LOWER VAIGAI

This section highlights the modernization of the basin and argues modernization did not take into account the ongoing practices of utilizing the river. The modernization includes three major components (i) building two regulators in the

[80] There are instances of similar suits against the PWD and Rural Development departments that were either simply thrown away at the initial stages or resolved in the favor of government using this case law in District Courts. I have discussed this point using some other court litigations in chapter 7.

[81] "அணையைக் கட்டினார்கள். அடிவயிற்றில் அடித்தார்கள்" நா. தில்லை கோவிந்தன் Available at http://www.thinnai.com/index.php?module=displaystory&story_id=20504011&edition_id=20050401&format=html [Accessed 21 August 2013].

river capable of fully diverting the water; (ii) concrete lining of the Periyar main canal; (iii) concrete lining of field channels in the Periyar command area. Based on the details, it is argued here that these efforts destabilized the entire river and the traditional tank systems.

Modernizing Vaigai canals (1969)

Because of the Vaigai reservoir and the previous works upstream, the river Vaigai was not flowing as usual and resulted in agitations and protests by the LVR farmers. The river bed became dry, almost all the spring channels stopped and the ground water levels had dropped by this time. Combined with the dryness and lesser flows in the river, making *korambu* (temporary dams to divert water into channels) became very difficult. The percolation in the river bed became very high. This was the justification for the modernization of Vaigai canal project (Mohanakrishnan 1997).

The department proposed to build two regulators in the river below Peranai and two canals from each of them on either side of the river. In 1968, the work commenced and was completed in 1979 at a cost of Rs 39.40 Million. The regulators were completed in 1977 and expected to head up even the minimal flows and divert them into channels that are formed then. The PWD thought they could easily monitor and control the entire network by controlling just these two regulators. The first regulator was built at Virahanur (at 48 km below Peranai), which would divert water into 38 channels, mostly belonging to Sivagangai district. The second regulator at Parthibanur (58 km below Virahanur) diverted water into 58 channels on both sides mostly in Ramanathapuram district[82] (Mohanakrishnan 1997, 176). All these 96 supply channels were of ancient origin and taking off directly from the river. After the construction of the regulators and

[82] A separate arrangement was planned for those tanks benefitted from Vaigai but located in Gundar basin. Two link canals were taken up one in Madurai district below Virahanur and another below Parthibanur in Ramanthapuram district. They were linked to a tributary of Gundar called Kiruthumal.

the new channels, they would be fed through sluices established on the channels. As Mohanakrishnan remarked, “the project was expected to result in better control and regulation of the flows in the river; facilitating easier distribution of river water into the canals, saving large ‘transmission losses’ that happen in the river bed” (1997, 175).

There were several technical challenges in forming the four new canals on both sides of the river to feed these 96 existing channels. First of all, there was no space available between the river and the off-taking points. Hence, it was decided to run the canals close to the river bund itself. In this way the canals shared a common bank with the river bank. Simply said, the river was divided into ‘two canals and a river proper’. Such a project to divide a river course into compartments of a river and canals was never heard off in the State. The project implementation was slow and completed in 1979, nearly ten years after its commencement. When the project was nearing completion, a flood washed away the newly formed embankments located inside the river bed and four channels became unusable (WAPCOS,New Delhi 1995; Mohanakrishnan 1997). The river reached its previous shape (before modernization) but the head works (to feed the channels) stood up and obstructed the flow into the ancient channels.

Each off take point for the 96 supply channels were provided with a head regulator with an understanding that it would eliminate the need for forming temporary dams (*koramb*u) by the farmers every year. That did not happen. The headworks formed on the four channels stood without much use right on the bank of the river, and the farmers resorted to the same old method of forming *Korambus* but with difficulty. Also, due to the obstructions in the head-works, the farmers had to train a new channel to circumvent the regulator which stood as an obstruction. It was a tragicomedy in the name of introducing new technology.

Changes in hydraulics of the supply channels and the river

After the head works on the newly formed channels, the (channel) openings became narrower. This reduction is based on an understanding that the channels would maintain sufficient head at all times from the newly built regulators in the river. Since they do not work anymore, if the same amount of water has to flow in the supply channels as in the past the farmers have to head up even more in the river. This led to additional work for farmers. It also created chaos for many tank villages and they had to struggle to pass the required water through the narrowed openings. The situation remained like this until 2000. The situation appear better after a world bank sponsored project[83] to rehabilitate these headworks and channels.

Through these technical arrangements, the hydraulics of the river and the channels had been changed forever leading to further suffering by farmers[84]. Thus the plan, which was to make the entire river as a regulated channel, failed.

Sand mining

Sand in the river bed maintains the bed level of the river. Bed level is an important parameter to maintain water flows into the channels feeding tanks. Any change in the bed level of the river will affect the flow into the channels as well as into the tanks. Sand mining in the river bed generally makes the river to flow deeper and pose difficulties in filling the tanks.

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[83] A World Bank funded project called Water Resources Consolidation Project (1994-2005) with a total loan of US$ 282.9 Million had Vaigai channel repair and modernisation as one of the components. The damaged Vaigai channels below Virahanur and Parthibanur were rehabilitated with a budget of Rs 428.7 Millions.

[84] Based on my visits to Virahanur regulator and the channels in December 2011. I have also visited this stretch many times in previous years as a staff working in the area and noticed the sufferings of the farmers to build up *korambus* (of several feet height) to reach the levels of the head regulator.

The construction boom in the 1990s and the arrival of mechanical excavators led to large scale mining all over the State including in Vaigai. Most if not all such activity was illegal and the Madras High Court observed "there is no proper legal provision enacted by the government to take action on illegal sand mining[85]". There were a series of public interest litigations in the High Court to prevent such sand mining in many rivers of Tamil Nadu. There was much litigation by the farmers and contractors that led to some changes in the law related to sand mining.

The *River Conservation Act VI of 1884* did not allow any mining that might cause damage to any structure or to the river. However, the violators faced a paltry sum of Rs 50 as a fine under s 22 of the Act. The *Madras Minor Minerals Act 1959* allowed mining wherever it was thought to be fit using manual labourers. In 2003, the government declared that it had a monopoly over quarrying the river for mining[86] and allowed the usage of excavators on a large scale. This has again been upheld by the Supreme Court of India[87] and mining is allowed in many rivers including Vaigai. This mining has further reduced the bed level of the river.

A lot of awareness exists about sand mining and its effect on ground water in Tamil Nadu. But what is not told to the public is that the channels from these mined rivers are suffering because of the level differences. Now most parts of the river (below Peranai up to Ramanathapuram big tank) have become deeper and the channels are elevated. So, water does not flow into the channels during thin flows. The problems of the farmers in diverting water into their supply channels

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[85] In *M.K. Janardhanam v The District Collector on 26 July, 2002, In the Madras High Court No.561 of 2001in W.P.No.985 of 2000*

[86] G.O.Ms no.95 Industries Department dated 1.10.2003

[87] Detailed discussions of important litigations discussed in the "*State of Tamil Nadu v P. Krishnamurthy* on 24 March 2006, In the Supreme Court of India, Appeal (civil) 5572-5644 of 2005.

were further compounded by the creation of the new head works after the modernization project.

This phenomenon became noticeable in the channels on the left below Virahanur regulator at every off-take point. The environmental assessment of Vaigai river commissioned by the PWD listed several places where such sand mining and consequent damages were rampant. About the lower Vaigai channels it said,

> In this location [close to Virahanur *anicut*] also there is heavy sand mining. Due to the sand mining and encroachment all these channels are not functioning. The Kathianur channel is completely extinct. In the case of other two channels the initial reach has been completely cut off and the channel exists after some distance. But **there is no chance for the** water to flow from the river (emphasis added) (Krishnamoorthy 2004, 67).

In the end, the modernization of the river and Vaigai channels that commenced in 1969 remained incomplete and a failure until another project came to rehabilitate these modernized works under WRCP.

A recent environmental report of the State government published in 2012 reported the tanks in LVR have the following problems: (i) insufficient water flows from the river. According to them tanks receive only 1/4th of the supplemental water from the river flows; (ii) most of the off-takes on Vaigai found not working; (iii) 88 km long Vaigai channels formed below Parthibanur need desiltation (Government of Tamil Nadu 2012, 449). This again shows that sand mining has compounded the problems of the offtakes and channels brought in by modernization projects.

Thus, sand mining allowed by the law and the courts against farmers petitions have played a substantial role in destroying the channels feeding tanks.

Modernizing Periyar – Vaigai under World Bank schemes (1982-95)

Based on the inputs of the National Commissions[88] on irrigation and agriculture the Fifth five year plan (1974-1979) suggested funding irrigation projects to modernize them. They had two main objectives: first to create irrigation potential (wherever feasible) and second to improve the utilization of the created potential and efficient management of water.

In Vaigai basin, even though no river basin commission was formed, plans were developed to undertake 'improvement or modernization' projects. The projects suited the PWD that had no construction works going on within the basin [89] as in the past. Periyar-Vaigai is the largest of all the irrigated basins in the state, second only to Cauvery basin, and had great importance among the bureaucracy and the planners. The proposed modernization aimed to increase 'efficiency of water use' at all levels - from the reservoir to the farm.

Funds from central allocations were used for the farm level improvements and loans were taken from the World Bank to modernize the dams, canals, and

[88] The second irrigation commission of India (1972) recommended having River Basin Commissions (RBC) at every basin and a National Water Resources Council (NWRC). The RBCs were expected to deal with preparation of basin plans, formulation of project wise *ayacut* development plans, conjunctive use of surface and ground water in canal command areas, remodeling of existing irrigation works to improve their performance and improvement to drainage in irrigation commands (Commission, Jain, and (India) 1972). The National Agricultural Commission also suggested to 'modernize' the irrigation systems at the farm level with an assumption that water use efficiencies are low at the farm level. Here in Vaigai, such remodeling and improvement of canals and field channels were started to be called modernization.

[89] In terms of irrigation potential and utilization, Tamil Nadu stood amongst the fully developed states even in the 1970s and there was very limited scope for any major program unless waters from Karnataka and Kerala were made available to the state. So new projects using 'increase the efficiency' was a good bet in this period when no scope for new irrigation development existed.

channel networks. Cement concrete lining of channels and canals was the chief component in both the cases.

Modernization of canals in Periyar-Vaigai is an extraordinary project in the state. Creation of additional irrigated areas had to be achieved without increasing the storage capacity of the reservoirs. Concrete lining of conveyance canals and channel networks were expected to lead to water savings. The water thus 'saved' had to be used to bring new areas into irrigation. According to the World Bank, the project was the 'first major attempt in India' to minimize water losses in conveyance and operation by rehabilitation and modernization of an existing irrigation system at a cost of USD 23 Millions in June 1977 (World Bank 1986, 1). Once again, Vaigai became a big experiment to test the concept of irrigation efficiency in an unprecedented scale.

The World Bank supported the project for the following components: (i) concrete lining the farm channels up to the plot sizes of 10 ha each; (ii) construction of a link canal from Vaigai reservoir to Peranai *anicut*; (iii) improvements to irrigation tanks; (iv) construction of canal service roads and village roads; (v) strengthening of the extension services; and (vi) extension of the existing Periyar main canal system to utilize the 'water saved' to increase irrigation command area. The Modernization project report even mentioned "Water savings were to be used to introduce two crop irrigation in areas that previously grew only one irrigated crop per year, and to bring new areas, previously rainfed, under irrigation" (World Bank 1986). There was no external evaluation conducted after the project but still the Bank concluded, "A major lesson of the project is that lining and rehabilitation of the canal system are not sufficient to attain full agricultural potential (World Bank 1986, 6)". Plainly speaking not much water was saved as aimed in the project and all that the project stood for in the name of modernization had failed.

There was also a phase II for the World Bank funded project. This time, an extent of 7,500 ha was expected to be brought into new irrigation by water savings made. The project activities: (i) excavating a link canal from the Vaigai reservoir till Peranai; (ii) extending irrigation to additional areas; and (iii) all other previous project objectives related to modernization were included (see above). An amount of USD 33.2 Million of loans was sanctioned. The project received five extensions beyond its schedule and came to an end in 1993 (World Bank 1995, v).

The project evaluation report of the World Bank citing an internal report claimed the following as the additional area brought under irrigation (**Table 7.4**).

Table 7.4. Areas as claimed to benefit from modernization

Sl. No.	Canal/Channel	Increase in Phase I and Phase II in ac
1	Periyar Main canal	39,178
2	Thirumangalam Main canal	5,375
3	Link canal	3,969
	Total	**48,522**

Source: (World Bank 1995)

An additional area of 48,522 ac is indeed a remarkable achievement in terms of efficiency improvements. This extent amounted to nearly a one third increase in the existing area under Periyar command. However, such claims are not accepted even by the PWD engineers themselves. Janardhanan Nair, a senior official participating in a departmental irrigation conference contradicted the report and said,

> The local people in the tail end area (of Periyar and Thirumangalam canal extensions) resorted to make damages to the infrastructures constructed in the modernization work. According to them, within a span of ten years after the construction of distributaries in the tail end area never the irrigation water touched in those distributaries. Also they believe that, in future also water will not reach their area. Now the costly structures constructed in the tail end reaches have become a mere wastage…Thus the prestigious Periyar Irrigation Modernization Project for which a huge amount of 175 crores of rupees spent, has failed to deliver the desired result (Nair 1997).

The World Bank's completion report also claimed that they had given substantial technical expertise for the project. But, nowhere in their completion and lessons learnt report was any mention or discussion about the tanks in LVR that had gone bad to worse in this period. The Bank's experts limited their technical understanding to their own funded project within Vaigai, as if Vaigai ended there.

Command Area Development Programme- CADP (1982-95)

When the World Bank funded modernization project was concrete lining the massive canal network, the CADP did the same at the channel networks at the farm level. In order to increase the water efficiency at the farm level every bit of field channel in Periyar Vaigai command (a total of 170,230 *ac*), irrigating a compact block of 10 ha and below, was lined with concrete. An amount of Rs 197.3 Million was spent on this project. The contribution by the CADP is also said to have contributed to the water savings (Venkatasamy 2002). The centrally-funded CADP and the World Bank funded modernization projects concrete lined every inch of the canals, distributaries, and branches; sluices were reconstructed, gates were refitted; field channels were lined and division boxes and shutters were fitted for every field. There is no comparable previous work in the state. In every sense the Periyar Vaigai areas became really 'modern'. Most of the farm level modernization are not in service any longer. My field visits during October 2011, and January 2012 in 9th and 10th Branch channels and commands of many direct sluices and tanks showed me that it is rare to find any modernised structure in order and working satisfactorily. A common observation made by farmers that the concrete planks and stones were taken away and used by individuals in their homesteads.

At the end of this modernizing era between 1969 and 1995, nothing was done to benefit the LVR tanks; instead they got damaged as discussed in the previous sections.

Water Resources Consolidation Project[90] - WRCP, (1996-2004)

WRCP in the Vaigai area was meant for the Reorganization and (re)development of Vaigai canals. The project brought the entire Periyar Vaigai system under one chief engineer, located at Madurai. Previous to the reorganization, the PWD was organized into portfolios such as Operation & Maintenance, Ground Water Development, Tank Irrigation, Designs etc., which were led by different chief engineers. WRCP consolidated all portfolios under a regional chief Engineer formed with basin as his jurisdiction. Vaigai basin thereby has got an exclusive chief engineer. The (re)development component attended to the serious repairs in the Vaigai canals and formed the channel again as made in the original plan of 1968. The two regulators of Virahanur and Parthibanur and Ramanathapuram big tank was repaired, costing an amount of Rs 331.3 Million and Rs 33.5 Million spent respectively. The results of these works on the canals and regulators are yet unknown because water flowed only three times in the river after its completion till 2012.

The post project evaluation was inconclusive. The report said, that flows into both the Periyar areas[91] and lower Vaigai areas had decreased over the last sixty years.

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[90] WRCP was a nationwide water sector re-organising project. The assumptions for the project include establishing organisational mechanisms to horizontally integrate various water related departments. This is done while re-developing the irrigation infrastructure. The Irrigation departments before WRCP had different branches such as Dam building, Ground water development, Hydrologic data collation, Irrigation operations and maintenance vertically organized. The project reorganised these various units on a basin level. The Public works department in Tamil Nadu is renamed as Water Resources Organisation–Public Works Department (WRO-PWD). This project brought together all water sources such as tanks, canals, and dams at one administration. However, the tanks listed as Panchayat tanks were left out in this exercise.

[91] There is a reduction of 31 % of total water flows to Periyar areas when compared between the periods (1941-55) and (1986-2000). This reduction is because of the ongoing dispute between Kerala and Tamil Nadu wherein the Supreme Court has restricted to store water only up to a height of 136 feet as against 152 feet.

Total water flowing into LVR were found to have decreased by 40 % when the annual averages of (1941-55) and (1986-2000) were compared. This is attributed to the completion of three medium sized reservoirs and continued abstraction of water (over and above the permissions) into Periyar areas from the Peranai regulator (CWR 2003).

This study again confirmed the apprehensions of LVR farmers that the dam building and diversions in the upper reaches is reducing their flows. All that surplus water thought to be available in the tributaries in the upper reaches was doubted by the report. The report also found even though the Virahanur and Parthibanur regulators and their canal networks were completely rehabilitated and in good shape, the water *could not flow into many tanks, and may not do so in the future*. The water could not be absorbed by the supply channels from the river due to the level differences between the sill of the head regulator and the bed of the river (CWR 2003).

Thus, all the technology and modernization projects were of limited or no use to traditional tanks in Vaigai. The projects caused damage to the existing tanks. The interventions in general proved to be damaging and required costly remedial situations. In the same period, the apprehensions of farmers that were dismissed as ‘needless fears’, ‘clamour’ or ‘unsubstantiated claims’ etc., were substantiated. The dependability of the river decreased to 35.7 % in 2001 (Ratnavel 2002).

Progress of irrigation from Periyar flows

While the LVR irrigation remains stagnant, **Table 7.5** indicates that irrigation from Periyar flows is progressing. This increase in Periyar areas is another reason for the doubts in the minds of the LVR farmers.

Table 7.5. Progress of Irrigation from Periyar flows

Period	Event	New area in ac	Cumulative area in ac
up to 1895	Before the construction of Periyar reservoir		
	Lower Vaigai (below Peranai)	141,245	
	Middle Vaigai (Manjalar and Marudhanathi)	17,153	
	Cumbum valley	12,000	170,398
1895-1958	After the construction of Periyar	173,511	343,909
1959-1974	After the construction of Vaigai dam	25,857	369,766
1974-84	Manjalaru and Marudhanathi reservoirs	6,098	375,864
1977-84	Periyar Vaigai Modernization (Stage I) - world Bank assisted	25,248	401,112
	Periyar Vaigai Modernization (Stage II) - world Bank assisted	18,426	419,538
1986-90	Extension of Cumbum Valley, and PTR canal	5,101	424,639
	Total	424,639	

Source: For irrigation before 1895 in Madurai district from Nelson (1868); for lower Vaigai areas from CWR (2003); and all other data from the respective project documents.

Note:

Due to urban expansion in and around Madurai city, an estimated area of 26,000 ac has gone out of irrigation and this water is unused.

7.7 PART VI RULES OF RESERVOIR OPERATIONS

Every reservoir when newly formed comes with new set of rules providing the basic operations of the scheme. In this section, I explore the complex nature of rules that are devised for operating the Vaigai reservoir and their assumptions and accounting procedures to be followed by the engineering bureaucracy. It has to be kept in mind that before any of these modern interventions, no rules were needed and none existed to regulate the river.

The Rules of operations of the reservoir

As we had discussed in the section 7.5, the reservoir stores two distinct types of water:

(i) waters from Periyar called Periyar credit; and
(ii) from its own catchment called Vaigai credit.

Periyar credit belonged to the new areas created after 1898. This includes the Cumbum valley in upper Vaigai, Thirumangalam canal and Periyar extensions in middle Vaigai.

Vaigai credit belonged to the old tanks in Vaigai that are mostly in LVR.

The rules in theory aim to account for these two different types of waters meant for many different areas. The following are the extracts of the rules of Periyar-Vaigai (PV) system dealing with the Vaigai reservoir:

> Rule 25 Ordinarily, only the water from the Periyar lake shall be impounded in the Vaigai reservoir and no part of natural flows in the Vaigai reservoir shall be impounded in the Vaigai reservoir except under the provisions mentioned below.

Rule 26 Whenever the natural flows of the river Vaigai at reservoir site exceed the discharging capacity of river sluices then, the excess flow shall be impounded in the reservoir and accounted as Vaigai credit.

Rule 27: When there is an anticipation that the Ramanathapuram big tank is about to surplus the water could be impounded in the reservoir and accounted as Vaigai credit.

Rule 28: At the discretion of the Executive engineer any flow in the river at any time can also be impounded and accounted as Vaigai credit.

Waters below Palanichettypatti village flowing across Suruliyar[92] river has to be accounted as Periyar flows. Vaigai credit at the reservoir is equal to Total Water in the Vaigai reservoir minus Periyar flows.

Rule 29: The reservoir had a storage of 6,800 Mcft [192.55 MCum] and of which 4,000 Mcft 113.27 [Mcum] was set for Periyar credit and the rest 2,800 set for Vaigai credit.

Rule 34: In addition, water required for the Madurai municipality shall be issued from the Vaigai reservoir at such quantities and at such times as the Municipality demand. But such issues shall not exceed 600 Mcft [16.99 Mcum] in any year.

Rule 29: In case, if the Vaigai credit exceeds that limit of 2,800 Mcft [79.29 Mcum] and there is any space in the reservoir that could be stored and released on a later date to old *ayacut* and not for the lower down tanks in Sivaganga and Ramanathapuram.

[92] Vaigai basin includes part of the area located above Palanichettipatty village. The rule thereby implied the Cumbum valley as part of Periyar waters.

> Rule 35: <u>At times of need,</u> the Vaigai credit available in the Vaigai reservoir could be utilized for the Periyar *ayacut* subject to the condition that the quantity drawn is restored to the Vaigai credit as early as practicable.

A plain reading of these rules would reveal the control goes up section after section. The language shifts from *ordinarily*, *whenever there is*, *in addition, in case*, *at times* and so on.

First of all, before the modern interventions, the river had a free run to the sea. These rules aimed a total control of such a system by the engineering bureaucracy.

Secondly, these rules are *just the opposite* of all the assurances given by engineers and politicians at the time of planning and construction of the reservoir. Consider the government press release specifically on this point in 1954:

> If, however, any floods exceeding such capacity (2800 Mcft) occur, and consequently have to be held back in the reservoir, they will be **passed down immediately after the peak floods** (emphasis added). For this purpose the capacity of the reservoir has been increased from 4,000 Mcft to 6,800 Mcft (Mohanakrishnan 1997, 137).

Rules 26 and 27 contradict the assurances issued in the form of press releases after farmer's agitations. Similarly, Rule 28 gave discretionary powers to impound water at any time. Rule 35 says, not only is the water due to Vaigai credit to be stored but it can also be given away to Periyar areas. But a similar privilege is not extended to LVR. As per the assurances given (when the reservoir was built), Vaigai credit will be released immediately after the peak flow, but the rules said as early as practicable. Such a practicality depended on many factors, often an political and decision making powers.

The apprehensions expressed by the farmers of Sivaganga and Ramanathapuram about taking away their water had thus found a place in the rules. This aspect is explained in some detail below.

A peak flow in Vaigai may not last more than a day or two. Therefore according to government assurances, the waters should not be held beyond a day or two. However that has not been the case. In reality, the Vaigai credit could be stored for months if not a year depriving hundreds of tanks. This happens in two scenarios: Firstly, when the available quantities are very small, PWD may say releasing smaller quantities available on Vaigai credit into the river is not worth enough to make a successful flow and hence it could be better put into use in Periyar areas where the flows are done through lined channels. This is possible under Rule 35. Secondly, in sub-normal years, when Periyar has insufficient flows for the second crops[93] i.e.) Oct-Dec, the probability is that Vaigai also will be sub-normal. However, Periyar performs better compared to Vaigai. Some flows of the previous year's balance of Vaigai credit will still be there in the reservoir, but not enough for a successful first crop. In such a situation, Vaigai credit is used for supplying the shortages occurred at the end of the first cropping in Periyar areas. This is made possible because releases in Vaigai credit happen only after the completion of first crop in Periyar *ayacut*[94].

For example, in September 1991, the reservoir storage had 900 Mcft [25.49 Mcum] of Vaigai credit, and 1,400 Mcft of Periyar credit. But water was not released to Ramanathapuram because the department claimed the flow would not reach the tail end of Ramanathapuram because of the dry conditions in the river bed. It could be true, but the Ramanathapuram tank farmers wanted a release of 1,500 Mcft [42.48 Mcum] that is borrowed from Periyar credit. The petition sent by a group of Ramanathapuram farmers in this regard wanted to use Rule 35 (facilitating inter account lending) to obtain a loan from Periyar account. This was not honoured, however in the past, Vaigai credit was liberally used to supply Periyar on several occasions (Vaigai Pasana Iyakkam 1991, 1–6).

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[93] First crop period is in June-September; second cropping is October-January

[94] Based on discussions with Ratnavel on 14 October 2010 at Virudhunagar

Since there was no provision in the rules to release Periyar credit to Vaigai, the request was not accepted, stating the Periyar farmers may agitate if done. Such agitations are common in Periyar areas because they are well knit and located in a smaller contiguous geography. A Dinamalar news report reads in 1997, as: "Today Vaigai waters released to Ramanathapuram: Madurai District Farmers are apprehensive". The report said Vaigai waters may not reach Ramanathapuram, because the river is damaged and dug up with full of pits for sand mining and hence it is better to use this quantity of 500 Mcft [14.16 Mcum] (belonging to Ramanathapuram) in Periyar areas, that faces shortages at the end of the crop season. Though, the water that thus released is rightfully theirs and belonged to Vaigai credit, it was still opposed and agitated by Periyar farmers through agitations and road blocks in Usilampatti, Madurai West, Vadippatti, and Melur (Anon 1997). Even though the LVR received supplies only during 5 years between 1986 and 2000 such organized opposition from the upper and middle reaches has become a routine. Had there been no reservoir in the first place there would have been no such issue at all.

Reduction in lower Vaigai flows

Mohanakrishnan, Advisor to Water Resources Organization (WRO) in 2009 was tasked by the government to find out the truth in the claims on LVR's decay made by many groups from Ramanathapuram and Sivagangai. He called a special meeting of the departmental engineers, representatives of LVR and others who have worked in Vaigai schemes (Vaigai Federation 2008). After looking at the data and the analysis he felt the Rule 28 has to be amended to correct the situation (Mohanakrishnan 2009, 10). This rule originally fixed the catchment area of Vaigai River by fixing its boundaries along with redefining the boundary of the Vaigai's catchment, he proposed an elaborate method to be used as part of the rule 28. It said there is a need for five datasets as follows:

Dataset A: Recorded average flow released from Periyar Power station

Dataset B: Sum of all abstractions in the channels of Cumbum valley

Dataset C: Inflow in the reservoir measured after the Suruliyar and Vaigai junction

Dataset D: Periyar credit = Dataset A minus Dataset B

Dataset E: Vaigai credit = Dataset C minus Dataset D

This new computation theoretically rectified the problem, and arrived at an appropriate way of accounting waters from different sources meant for different users within the basin. The government notified the amended rules on 21-04-2010 with immediate effect (Principal Secretary 2010). It might appear simple to come to this decision but it took nearly six decades to remedy the situation and in the meantime resulting in the decay of LVR tanks. There is a question over implementation in the face of new court cases mounted to annul these amendments.

As per the 2010 amendment to the rules of Vaigai reservoir, it was finally agreed that the 40 % of the flows due for LVR went into Periyar areas in the past. The phenomenal increase in Periyar *ayacut* is explained by this phenomena of abstracting flows meant for LVR. The Periyar *ayacut* as originally planned in the nineteenth century by Pennycuick was 75,000 ac, but it grew into 177,000 *ac*[95] in 1995. This growth in Periyar is understandably at the cost of LVR tanks. Unlike Periyar areas where the engineering bureaucracy maintains some records of areas cultivated, nothing is available for the LVR. No specific records of cultivation under each tank exists in LVR. The situation is only as good as in Fischer's times.

[95] The figure varies, a higher figure of 208,000 *ac* cited by the protesting Lower Vaigai farmers.

7.8 PART VII INTENSE STRUGGLES IN LOWER VAIGAI (1985-2000) AND CONTINUING COURT CASES

The amendments made in 2010 have a long history of protests behind them.

Between 1985 and 2000, water has passed below the Peranai *anicut* for only five of the years. During this period, several groups became active in protesting. Vaigai Pasana Iyakkam or Vaigai Irrigation Movement listed the following reasons for their protests.

(i) the river had surface and sub-surface flows of a depth up to half a foot in its entire stretch until 1959 (when Vaigai reservoir was completed);
(ii) There was no drinking water scarcity at anytime in the history of the villages in Sivagangai and Ramanathapuram that lie closest to the river. However after this period, the scarcity for drinking water became high.
(iv) All assurances given to LVR farmers during the dam building were not respected and honoured.
(v) The water accounting system introduced after the Vaigai reservoir is unknown, unfamiliar and difficult to understand.
(vi) Vaigai had lost its historic irrigation and some areas are becoming desert.

The movement led by a lawyer at that time requested a judicial commission by a serving High Court judge to study the rules, regulations and accounting systems of all reservoirs and schemes (Srinivasan 1990, 1–4). That did not materialize because of the opposition from the bureaucracy and the Periyar farmers.

Between 1990 and 1995, LVR did not receive any water supply from Vaigai at all. This is due to non-release of Vaigai credit in the river. The river became totally dry. The farmers organized several protests including many road blockades to bring the problem to the attention of the government (*The Hindu* 1995). Political parties including the Communist Party of India through their farmer's organization All India Kishan Sabha (AIKS), organized rallies, propaganda and protest marches along the river to bring farmers to the street. Other parties including Tamil Nationalist Movement lead by PL.Nedumaran, and groups of activists from various parties organized conferences to explore revising the rules of Vaigai reservoir in order 'to save Lower Vaigai' from becoming a desert (Kathiresan 1997; Kathiresan 1998, 4–5)

In 1996, a writ petition was filed in the Madras High Court by Ramnad big tank farmers association to seek the directions of the court to judiciously implement the water accounting rules 25 to 31, 35 and 44 and 46 governing Vaigai reservoir (*Ramnad Big Tank Farmers Association v Government of Tamil Nadu* 1996). The petition was disposed by the court in 2003, instructing the government to implement the rules 'judiciously'. However, the government did not make any efforts to go into the issue of assessing the fairness of rules and correctness of water accounting systems. The different groupings among the LVR farmers organized into a federation and took up the issue repeatedly. Nothing materialized with regard to a change in the rules until 2010 (2006a; Vaigai Federation 2006b, 1–5).

The Conservation council for small scale water resources[96], a group of eminent persons, made suggestions to government to bring some fairness in accounting and amend the rules in 2002. These suggestions were based on various demands made by farmers, and Ratnavel's observations over the last thirty years. The substantive part of the suggestions is to rectify Rule 28 and measure waters properly, and avoid booking the LVR waters into Periyar account (Shanmugham

[96] The council is a group of eminent scientists, experts, bureaucrats and engineers. It has Dr.M.S.Swaminathan as Chairman and C.R.Shanmugham as Secretary. The members in 2010 included Dr.A.Mohanakrishnan, and Dr.Panchanatham, retired chief engineers of Tamil Nadu PWD; M.P.Vasimalai, NGO activist; K.Rajivan, retired civil servant; Dr.Marxia Gandhi, retired archaeologist; and Pulavar Lakshmikanthan, Representative of Madurai District Tank Farmers Federation. The council is an initiative of DHAN Foundation, an NGO to bring the attention of the people and the government towards conserving traditional systems of irrigation in Tamil Nadu.

2002, 2–3)[97]. These observations were agreed to be correct by the Regional chief Engineer in 2006 after his own assessments (Chief Engineer Madurai Region 2006a).

Since the PWD agreed with the computations, the regional chief Engineer at Madurai was asked by the government to correctly re-define and establish accurately what amount comes from Periyar. This has to be done at the Palanichettypatti where the measurements are currently taken for computations. The chief engineer analysed the original Periyar project proposal made by Pennycuick and interpreted that the Cumbum valley in upper Vaigai has to be given 'as much water they needed' from Periyar waters. Hence he concluded whatever waters used in Cumbum valley should be held as Periyar waters. Based on this new understanding, he said, "The flows passing down the Palanichettipatti *anicut* [last *anicut* in upper Vaigai] across the Suruliyar shall be **declared to be Periyar waters limited to the Periyar lake <u>discharge through the tunnel</u> and the pick-up weir <u>less</u> Cumbum valley usage <u>less</u> conveyance loss**. (emphasis as in the original) (Chief Engineer Madurai Region 2006b)".

Sample calculations made by him for the year 2004-05 in **Table 7.6** showed nearly 41 % of water has to be added to Vaigai account. According to this view,

(i) the drainage of Suruliyar river entirely belong to Vaigai credit because water use by Cumbum valley has to be booked as Periyar account;
(ii) conveyance losses occurring in Suruliyar (while transmitting Periyar waters) have to be borne by Periyar account.

[97] Based on Ratnavel's earlier computations for the period from 1965-1979 an average of 2150 Mcft was available to Vaigai credit but accounted as Periyar waters. This quantity according to him, would be enough to cultivate a full crop of not less than 25,800 *ac* (Ratnavel 1998, 6).

Table 7.6. Flows based on the existing and proposed rules

	Total flows in Mcft		Difference[98]
	As per the rules of 1974	As per the proposed Rules	
Periyar credit	17,807	15,058	(-) 18.25 %
Vaigai credit	3,966	6,679	(+) 40.62 %

Source: Extracted from the annexure of recommendations made by the Advisor to the government on 12-01-2009 (Mohanakrishnan 2009)

Further analysis made for a period of 27 years between 1981-82 and 2001-2008 using this method concluded Vaigai credit would increase by 2270 Mcft [64.28 Mcum] per year. The Chief engineer foresaw the consequences of adopting this new method of measurement and said, "the beneficiaries of Vaigai old *ayacut* are very much satisfied as they feel that this correct form of assessing Vaigai credit renders justice to them". But, "Periyar *ayacutdar*s (in the middle Vaigai) are not pleased with this method of computation as they will have to forego 2,270 Mcft [64.28 Mcum]. He recorded that "when consulted they show displeasure to this method of flow measurement" (Chief Engineer, Madurai Region 2009, 3). However, the government agreed with the new interpretations, notified and amended the rules on 21 April 2010 with immediate effect (Principal Secretary, PWD 2010).

It took nearly half a century after the reservoir was opened. We need to recall that the agitating farmers raised this issue in their petition of 1950 and said this accounting method will lead to such mistakes. We may recall the petitions given by LVR farmers while protesting against the reservoir in 1950. They said, "It is

[98] Note: Percentages are worked out by me by taking the flows based on revised rule as the base.

impractical to keep account of water from Vaigai catchments and Periyar flows separately. Releasing Vaigai flows will not be practicable and technically realizable from the reservoir if stored. Response of the Engineers who had drafted the scheme is not convincing and remains eyewash" (Point 7 of the Memorandum. See Annexure 13). It happened just as they said.

In my view, this amount of 2,270 Mcft alone does not explain the reduced dependability of LVR tanks. The old contention made in Fischer's suit about the changes in the *anicut* has to be probed further with daily measurements. Such accurate computations may provide some reasons for the decline of LVR.

Why there was a mistake?

As Scott (1999) has argued the belief in the bureaucratic systems is such that it reinforces itself again and again. Mohanakrishnan, while updating the history of Periyar reservoir as late as in 1997, wrote the 'lurking fears' of stealing of water belonging to lower Vaigai as 'unjustified'. Specifically, he said,

> there has been a fear lurking in the minds of the people downstream in the Vaigai basin that the natural flow of the river Vaigai was getting diverted into the Periyar Main canal starving the large number of the open channels taking off from river Vaigai to feed the minor irrigation tanks. The fears got compounded with the formation of the balancing Vaigai reservoir in the 50s which incidentally functioned as a flood regulator. **All these fears were not however justified for the reason that the flow regulation both at Vaigai dam and at Peranai regulator is always done keeping separate accounts** for water drawn from the Periyar reservoir and the flow generated in the Vaigai catchment and releasing the Vaigai river flows only to the Vaigai *ayacut* (emphasis added) (Mohanakrishnan 1997, 174).

He believed that the systems are in place to take care of any manipulations. However, it was found after a long struggle as that was not the case. When he was asked to study the claims of continuous failings of LVR tanks in 2009, he had to accept there is something terribly wrong all these years. At that time, he said,

> The problem arose when accounting had to be kept separately for the storage that is held in the Vaigai reservoir, of the waters received through these two sources and relapses made from the reservoir to be regulated such that the transferred waters only are used in the Periyar Irrigation system and the in-basin waters are used wholly for the Vaigai *ayacut* (Mohanakrishnan 2009, 4).

When the same accounting argument was denounced by the protesting farmers in 1950 (refer to point 7 of Annexure 13) another respectable engineer of the times E.V.Narayanan described these fears as 'unfounded'. According to Mohanakrishnan, Rule 28 [as proposed by Narayanan] had gone wrong for nearly fifty years because of the assumptions made by those who framed it. Mohanakrishnan said,

> …I am afraid that this issue of clear separation of the transferred waters and the in-basin waters has not assumed that importance or received that much of attention with those who framed the Rules (Mohanakrishnan 2009, 4).

Mohanakrishnan is a respectable irrigation engineer of his times in India, has held very high positions and was also an academic. In the same way, his predecessors were also said to be revered figures in the engineering department. Narayanan and his contemporaries were hailed as impartial and dedicated. But yet they seem to place such an importance to the systems that they created that downplayed the farmers' fears whenever raised.

The time series analysis done by the regional chief engineer of Periyar Vaigai in 2006, using the amended rules, demonstrate that the usurping of lower Vaigai waters is not a phenomena that appeared after the Vaigai reservoir was built but has been happening since the days the Periyar started flowing into Vaigai. Mohanakrishnan again conceded that it may be true this phenomena is from the days of the British, but said that was merely incidental, and not done with any particular intentions in mind. He defended Pennycuick the man who modified the Peranai and established new rules for Periyar. He said,

> It would not have been his [Pennycuick] intention to usurp for the new *ayacut* he was creating. He would have planned to create the new *ayacut* to be fed only from the waters transferred from Periyar. If incidentally then existing *ayacut* in the Cumbum valley of the Vaigai basin got stabilized and enriched and also is largely extended, it is just because it happens to be the conduit through which the Periyar waters had to be carried to be fed through the Periyar Main canal. In that process, there is a mix of transferred water with the in-basin waters (Mohanakrishnan 2009, 3).

Fischer's suit was all about this.

Fischer claimed the government was usurping Vaigai waters above Peranai by modifying centuries old *anicuts* that serves hundreds of tanks that are far away. The colonial court at that time found his claims to be 'unfounded' and wanted proof of permanent injury which he could not make available. Fischer could not provide any data to satisfy the court and relied on his experience that was not accepted by the court.

Creating conflicts

Even after these changes brought in Periyar and Vaigai reservoir rules in 2010, there is no guarantee that they will be implemented. As the chief Engineer, expressed in his letter to the government, the Periyar *ayacutdars* were highly displeased and wanted the government not to change the rules. An identical petition sent by two farmers federations functioning in Periyar areas claimed that they were not given the opportunity to express their views on the amendment (Seeman alias Meenatchisundaram, 2010; Dharvesh Maideen 2010). They have also filed writ petitions to annul these amendments claiming proper process not followed[99]. Another round of litigation in order to find out which rule is correct is ongoing[100].

[99] (*M.Kesavan v Cumbum Valley Distributary Committee and Others* 2010; *Old Vaigai Ayacutdars Association of Ramnad, Sivagangai, and Madurai District v Cumbum Valley Distributary Committee and Others* 2010; *Poorviga Vaigai Pasana Vivasayigal Koottamaippu v Cumbum Valley Distributary Committee and Others*

7.9 PART VIII SUMMARY: ROLE OF LAW AND TECHNOLOGY IN DEALING WITH TRADITIONAL TANKS

Before Periyar project, no major manipulation was possible at any stretch of the river. Communities had their own way of making out the amount of water that flows in the stream filling up their tanks in a sequential manner. After Periyar, the existing *anicuts* were raised, fitted with gates, and measurements had to be made, and an authority was established to control the river. A new set of rules and management mechanisms came along with them. Establishment of Vaigai reservoir and three other medium reservoirs led to arresting all flows in the river in a season or in some cases of the whole year or for years together. The farmers, objecting to all these changes, suggested irrigation development should continue as it was done in the pre-colonial era by reviving and perfecting the channel networks without arresting the river at any stage. As we have discussed in the foregoing discussions, all the reasons meant for establishing Vaigai reservoir became questionable. Many more technical improvements followed in the name of modernization and technology improvements and resulted in questionable results.

With the many rules and new structures introduced, an elaborate accounting system was put in place. A big bureaucracy became a must, without which collating the data and computing the flows may not be impossible. Even if the data are known, making decisions about water releases to the tail-enders depended upon the officers and the politicians located at the head reach. Thus the pre-existing and historic beneficiaries in LVR spread in 400 villages in a 125 km

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2010; *Cumbum Valley Distributary CommitteeV State of Tamil Nadu and Others* 2010; *Periyar System Project Committee v State of Tamil Nadu and Others* 2010) Currently ongoing in the Madurai Bench of the Madras High Court Writ Petition numbers 7055 and 7056 of 2010.

[100] The Madras High Court has adjourned the case indefinitely. Since 2012, the proceedings are pending before the court.

stretch subjected to a highly complicated system operated entirely by a bureaucracy.

The responses of the engineers, as noticed in the correspondences of noted engineers, indicate their understanding was mostly based on some simplifications without understanding the intricacies involved in tanks and rivers. As Scott (1999) eloquently elaborated, the important five characteristics of 'state simplifications' were found to be true in the case of Vaigai reservoir project. Scott said,

> Most obviously, state simplifications and observations are observations of only those aspects of social life that are of official interest. They are interested utilitarian facts. Second they are also nearly always written (verbal or numerical) documentary facts. Third, they are typically static facts. Fourth most stylized states are also aggregate facts. Aggregate facts may be impersonal (the density of transportation networks) or simply a collection of facts about individuals (employment rates, literacy rates, residence patterns). Finally for most purposes, state officials need to group citizens in ways that permit them to make a collective assessment (Scott 1999, 80).

During the times of British, the official interests were simply to maximize the revenue collections. Irrigated areas paid more taxes to the government and hence converting additional areas for irrigation and rice cultivation was the utilitarian view. After the British, the official interests changed from mere financial gains. 'Grow more food' was the utilitarian starting point though there were always alternatives to achieve the same, as noticed in the Vaigai reservoir project. There were additional factors such as electricity generation that joined this utilitarian list later. Water for irrigation and power thus became the major official interests in river basin planning.

There was no consideration of drinking water or other uses of water by the communities along the river. In the water starved areas of Ramnad district, Vaigai river bed was the main source of water for communities and their animals to live upon. Once the reservoir came into existence, the river stopped flowing for months and years and it occurred to no-one that anyone would depend on the river for drinking and domestic water requirements that are beyond the irrigation uses of the river.

The ‘facts’ cited by the planners were said to be surplus water and arresting the waste going to the sea. This was again a purely utilitarian and technical proposition. Many of these ‘facts’ were contested and on a later date, proven to be incomplete or wrong or incorrect based on faulty assumptions and simplifications. However at the time of planning all the objections raised by the farmers were ignored or even mocked as ‘ill founded, unsubstantiated etc.’ From Ryves to Narayanan the engineering minds seemed to have worked in the same way, ignoring the farmer’s practical knowledge, worldly experiences of water management and understanding of the river.

The courts too were no different when it comes to these facts. It only accepted written down records as facts. As we had seen in Fischer’s suit, the High Court did not accept the version of farmers about the water flows in Vaigai. It agreed with the engineer’s version of accepting the aggregate water flows estimated by the department as correct. The nuances of the river ecosystem that offers a substantial amount of subterranean flows could not be quantified and hence were not considered as a fact in the case. The farmers apprehended and revealed during the court arguments that altering the river flow might lead to the death of subterranean flows over time. The court did not agree to this, but over time this has come true. But still the farmers lost the case and their entitlement.

The existence of surplus in Periyar and Vaigai which formed the basis for dam building was based only on the aggregate figure of decadal water flows. But when it is broken down into annual or seasonal figures, it says something different. To build a major reservoir with an investment (of Rs 20 Million in 1954) ultimately irrigating 11,000 *ac* of additional area in three out of seven years looks unbelievable but substantiated by the government. The same area could have been easily achieved in reviving some of the old tanks with a fraction of the cost without altering any of the hydraulics of the river. Yet the attractions of modern technology seem to be at work on the minds of these engineers and planners.

The governments, both the British and the Indians, grouped the users of Vaigai into different categories even though they were the same peoples and using the same river differently. Dividing them started during the British, the divisions were made as *zamindari* (under the native land administration) and *ryotwari (*under the direct British administration). The continued favouring of one particular group against the other, divided the users. This went on into creating several subgroups, pitting them against each other in tributaries and even in smaller channels as we saw in Manjalar and other reservoirs.

It is notable that the department always favoured the areas that were geographically closer to the new dams, schemes developed by them and controlled by them. The tail end areas, old and highly decentralised systems deserved no or very least attention. As against the secured water release given to the newly created Periyar areas, the historic areas are left in the lurch. For example: How does any village in Ramnad know how much water is going to flow in the river and from there to their tank?; How can anyone plan for filling up their system when they do not know what amount will come into the river? Even accepting this as an inherent shortcoming in the design of the system, there were other serious issues related to the measurements. The way the measurement mechanisms were set up would make anyone wonder why it favours the newly created areas.

Analyzing the two centuries of 'science based planning and development' efforts covering forestry, industrialization, collectivization and urban planning, Scott terms them as 'authoritarian high modernism'. He said, "High modernism is thus a particularly sweeping vision of how the benefits of technical and scientific progress might be applied – usually through the state- in every field of human activity (Scott 1999, 91)". Scientific progress in the form of dam building and other modernization projects as it happened in Vaigai did have all the three elements as Scott found necessary. As he wrote, "Most tragic episode of state development in the late nineteenth century and twentieth century's originate in a particularly pernicious combination of three elements: Administrative ordering of nature and society; Unrestrained use of power of the modern state as an instrument in achieving the designs; Weakened or prostrate civil society" (Scott 1999, 89).

Administrative ordering of nature by way of bringing rules to operate Vaigai system is very evident since Periyar started flowing into Vaigai. The rules in Vaigai in general divided the users into two categories (users of Periyar and Old Vaigai) and tended to pit one against the other, while favouring one (Periyar users) of them. The subjugated civil society in the *zamindari* areas of Ramnad could not proceed beyond a point of resisting the project. Their opposition could not contain the unrestrained power of the state to deploy huge investments and clearing all the objections in one or other manner, including the use of courts against them.

As Scott said, a thoroughly legible society "is likely to create new positional advantages for those at the apex who have the knowledge and access to easily decipher the new-state created format" (1999, 78). The 'positional advantage' of the *ryotwari* areas and the riparian principles used in determining the ownership and control over the river gave an upper hand to the new comers initially with the British, and later through the government. In this case, the Periyar areas were in the upstream, closer to the point of control and administered by a modern bureaucracy as *ryotwaris.* The LVR areas remained decentralised, administered by *zamindars* who had no or limited capacities of modern planning as their counterparts had.

Apart from the positional advantages, knowledge and access to the data related to water levels and official records existed and continue to exist only with the government PWD that is closer to Periyar areas. Even though for name sake the department had carved a combined Engineering division for the entire Periyar

Vaigai system, there is hardly anything that exists in LVR areas in the form of control mechanisms, data records and other details to take on the upper reaches.

Technological alternatives

A series of technological alternatives were suggested to cope up with the deterioration and decay of the river and the reservoirs and consequent conflicts. These alternatives are even more dreaded compared to the original interventions that led to this situation in the first place. The Vaigai reservoir desilting project planned and estimated at a cost of Rs 1.70 billion in the year 2010[101] is a project to be cited. Desilting of reservoirs in this scale is rare. There is no historic experience anywhere in the country of removing and moving such a high volume of silt (27.545 Mcum) from a single reservoir. The desilted earth is planned to be dumped in the same catchment or in foreshore villages[102]. First of all, desilting of such a volume, is itself a logistical nightmare and requires an extraordinary amount of planning to avoid adverse consequences[103].

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[101] "Desilting of Vaigai Reservoir" Available at http://www.hindu.com/2011/06/12/stories/ 2011061259820700.htm [Accessed 11 June 2013].

[102] The largest ever silt removal from reservoirs is done in the twin tanks of Bhopal town in Madhya Pradesh under a project named Bhoj Wetland Project. The project claimed to have removed 85,000 cu.m from the Bhopal small tank and 2.7 million cu.m from the Bhopal big tank. The project was investigated in 1993 and executed during 1995-2004 by a special administration, directly supervised by the consultants of the Japan Bank for International Cooperation (JBIC) that provided the loan. I visited the project in 2003 hearing about the scale of desilting, and the operation resembled a large professional mining company with hundreds of trucks and excavators at work. Some details are available at (Kadankar and Mukherjee 2013)

[103] Assuming 500 trucks operating for 24 hours a day, with 50 huge excavators put to work, the operation would need four years to complete when undertaken in the lean period of four months a year. This exercise would result in dumping of around 10 feet depth of silt and soil on all of the 3,000 *ac* that is supposed to have been agreed as dumping grounds. The scale of operation would be just like open cast mining.

I have discussed about the World Bank funded modernisation projects that failed in achieving what was stated as its objectives. Also there are several bed dams that are being built across the river in several places at least to store some ground water. This was proposed to counter the ill effects of sand mining done throughout Vaigai. There are others who are seeking projects to construct a series of dams for each of the 96 supply channels to pass water into them. The proposals for rehabilitating and modernizing Vaigai keeps flowing every year from various bodies. It was true that the technology interventions such as Periyar brought great benefits to the new areas.

While Periyar project did not directly result in the detriment of the LVR it paved the way for remodelling the *anicuts*, establishing several control mechanisms and rules that led to the decay of traditional Vaigai. Hence, it is not my case that everything about the Periyar project is bad. Rather, I argue elsewhere that such projects may be needed to benefit many hundreds of tanks that have deficient supplies from its catchments (Seenivasan 2014). However, the way the Periyar project modified the hydraulics of the Peranai *anicut,* centralising the water control and administration through establishing complex mechanisms became a serious issue for the traditional users.

There are three different damages as it is visible from the above discussions. They are (i) reduction in area benefitted by tanks in LVR; (ii) the reducing dependability of tanks; (iii) poor condition of the present head-works, channels and the river bed. For me, getting water into a tank should be the most critical aspect of any assessment when compared to looking at any other structural parameters. The tanks might look good for its appearance but perform poorly without its water. In that way traditional tanks in LVR are undoubtedly in decay and decline after all these modern interventions.

The discussions here demonstrate that the government control on traditional tank systems began through a series of colonial laws, especially land settlements viz. *ryotwari and zamindari*. These settlements did not understand the integrity of the traditional technology in full, but rather treated them as another piece of property to generate revenue. They artificially divided the basin into *zamindari* and *ryotwari* areas and pitted one against the other. The land revenue law in itself thus became a source of conflict.

In conclusion, the reasons for the conflicts in this traditionally tankfed area can be attributed to the new projects of building reservoirs, and other head works in rivers & streams that are already used by traditional tanks. These projects used doubtful simplifications about the availability of water, and generalizations were contradicting to prevailing practice and observed knowledge. The interventions especially the river channel modernization, lining of canals and field channels did not result in any benefit to the traditional tanks as promised.

Laws and judicial interventions used to favour these new technologies and interventions through state-sponsored projects ultimately led to this decline and consequent conflicts reflected in agitations and court litigations. Rules to operate the reservoirs and various other head-works were introduced affecting the traditional operations. Water supplies are presently fully controlled and made available only from the reservoirs. Thus the natural flows in the streams and river have been totally altered.

New and additional areas for irrigation were added in the upper reaches claiming the benefits of modern projects. The newly added areas have locational advantages. They are either closer to the reservoirs or served by dedicated canals from the reservoirs. The new structures are highly centralized and had come with a permanent bureaucracy. Mostly, the bureaucracy planned and built them through special projects and operated and controlled them with no or minimal role for the local communities. On the other hand, the older systems did not have any bureaucratic intervention but was regulated locally by the local villagers.

The traditional tank chains and the *anicuts* were plain works that cannot be manipulated with ease. They required no complicated operations and in rare cases there were shutters and gates made of stone slabs or wood. On the other hand, in the new systems like the reservoirs and channel networks, elaborate rules for regulation of water are introduced. Such rules written at great length with tricky and complex assumptions were unheard off. When the old irrigated areas were merged within the new projects, both were brought under these complex rules. Part of the older areas was brought into new schemes in the name of 'stabilization[104]' of the old system and the rest came in by default. It is true that the older systems did suffer at times, for want of water, however they were performing exceptionally well on a long term basis. After their mergers with new projects as we saw in Manjalar, Marudhanathi and Sathaiyar their difficulties increased up leading to more and more conflicts with the newcomers.

On the whole, the reduction in dependability of the river for the traditional tanks in LVR is a consequence of the new technology interventions such as building reservoirs, head works and altering river hydraulics. In summing up, at various stages the government used the law, technology, management systems and judicial interventions to do what it did. But such efforts did not address the concerns of the prior users and led the basin to deteriorate further. Therefore, the ongoing agitations and court litigations are the consequent disaffection among the lower and upper reaches of the basin created by these interventions in the name of modern technologies.

[104] Stabilisation is meant to make good any shortage of water in the old areas by providing additional water from the new schemes. This is normally done by delivering the stored water from the centralised Vaigai reservoir.

8. A MESO-LEVEL UNDERSTANDING OF TANK CONFLICTS-CASE STUDY OF KOTHAI ANICUT SYSTEM (KAS)

Turning from a macro-level perspective of conflicts in a larger river basin level in Vaigai in the previous chapter, the discussion here revolves around a smaller geography concerned with sub-basin named Varadhamanathi and a chain of tanks named Kothai *Anicut* System (KAS). This chapter answers a part of the research question about how the present day government views the tanks when it desires to convert them for purposes other than holding water. Converting tanks for extraneous uses in this chain of tanks invited a range of conflicts, of which some were addressed by the courts. The dispute depicts the reasons for such conflicts, how they are dealt by government and the courts, and the effects of conflicts on the performance of tanks in some details. This chain of tank had also undergone technological interventions in the form of building a reservoir, altering size and shapes of tanks which in turn contributed to social conflicts. The chapter argues (and also complements the understanding developed in chapter 5 and 6) firstly that the law regarding the tanks do not treat them as a technology system and uphold their integrity; secondly the government treats the tanks and dependent farming communities as unimportant; thirdly the existing laws are seldom implemented. KAS is an ancient network of seven tanks connected by a small river in Palani Taluk of Dindigul district in Tamil Nadu. Even though, all tanks in this chain are affected, the conflicts noticed in them are not uniform in every tank. Two of the large and important tanks within the chain is discussed in detail.

Palani: The town

KAS is found in and around the town of Palani. The place is one of the 32 heritage towns in the state and a pilgrimage centre for the Lord Murugan, an important deity for Tamil Shaivites. Historically, the Lord is worshipped in many cities of Pandiyas of Madurai (Clothey 1972), Pandiyas were known to be great tank builders in southern Tamil Nadu. Tamil literature depicts the Lord as a hunter’s god as well as an agriculturist’s god. The temple for the Lord is located on a small hill surrounded by the paddy fields irrigated by the KAS. Tank irrigation and paddy cultivation in and around Palani is very ancient[1]. Further the name of one of the tank (Vaiyapurikulam) suggests the titles of those rulers ruled this part before 7thcentury A.D. Palani remained a township with thriving agriculture in its midst through the ages. It became a municipal town in 1886 with a population of 13,315. In 2001, it had a population[2] of 67,231 people. Because of the temple, the town receives pilgrims throughout the year. On an average around 12,000 pilgrims are received in a normal day and that rises up to 0.5 to 1 million during festivals[3] that happens 40 days in a year. According to the tank farmers, in the past, it was customary for the visitors to take a dip in the biggest of the tanks in the chain named Vaiyapurikulam tank before they climbed up the hill to offer prayers to the deity. See Figure 8.1 for the location of the tanks and proposed facilities. Their bullocks, carts and horses were parked in the tank bed and bund. Therefore, the tank served thousands of visitors apart from offering water for irrigation. In 2011, the town's geographic area was 6.63 sq.km area, of which tanks and its channel networks[4] (that are still functioning) alone constituted 20.31 % of the town area and classified as 'water bodies' in the urban administration records (Palani Municipality 2008, 21).

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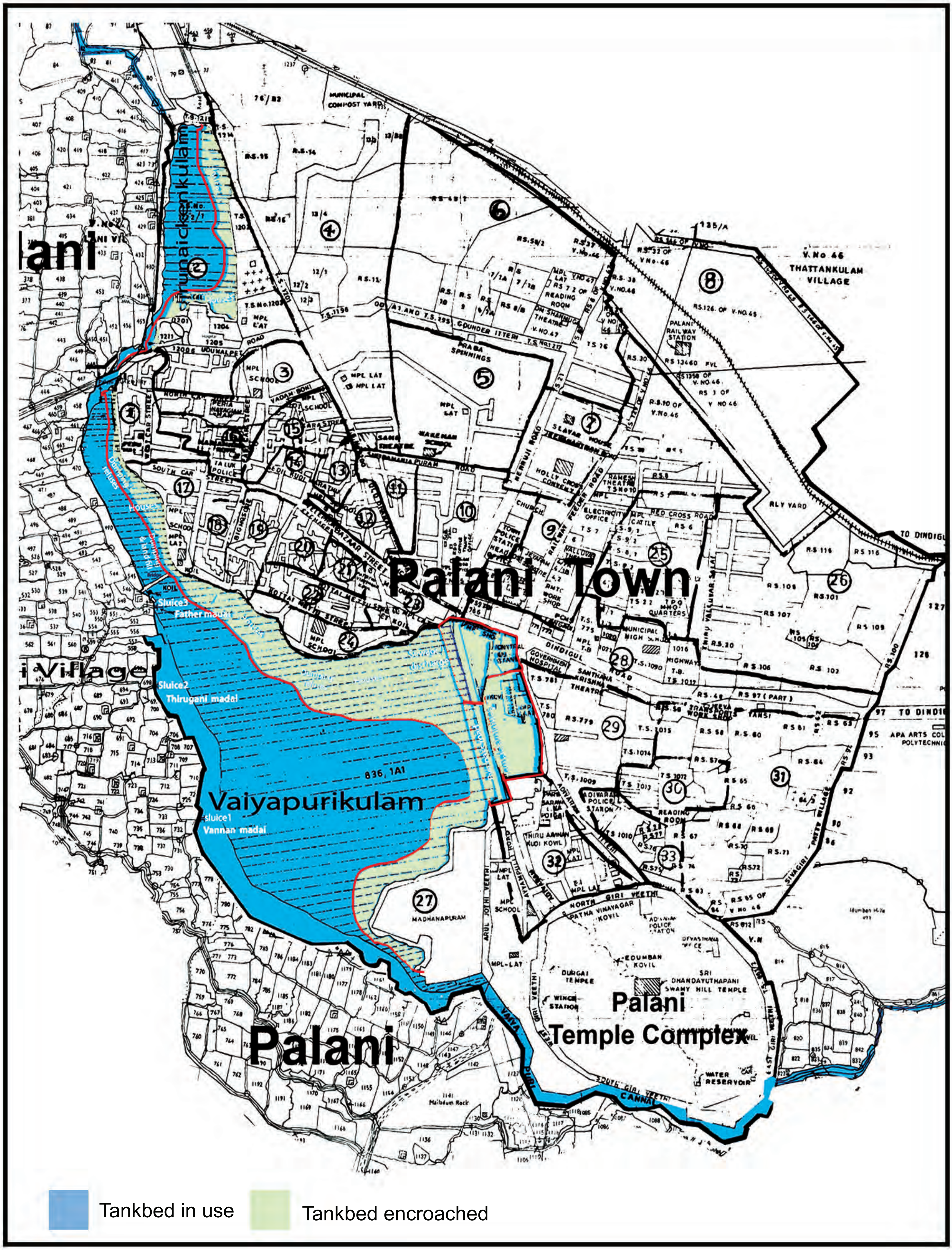
[1] Even during the year 2009, new archaeological excavations in *Porunthal* village near Palani town revealed a sealed clay pot with rice. The pot is inscribed with Tamil writing and filled with cultivated rice (Rajan 2009). The rice in the pot is dated to be around 450 BC. Source: The Hindu. "Porunthal excavations prove existence of Indian scripts in 5th century BC: expert." Updated: October 15, 2011. Available at http://www.thehindu.com/news/states/tamil-nadu/ article2538550.ece [Accessed 15 September 2012].

[2] Census of India, 2011. Available at http://www.censusindia.gov.in/pca/ default.aspx [Accessed 22 October 2012].

[3] Available at http://municipality.tn.gov.in/palani/abc_city.htm [Accessed 22 October 2012].

[4] Town Planning records classify the tanks, channels, and connected ponds as water bodies.



Not to Scale

Fig.8.1 Location of the Twin Tanks and Surroundings

Source: Reduced from two village maps (1976) and a Town survey map (undated) published by the Government of Tamil Nadu.

8.1 VARADHAMANATHI SUB-BASIN

Controlling the stream: From free flow to a controlled flow

According to the Tank Restoration Survey (TRS) memoirs KAS was classified as a 'sub-group[5]' fed by Varadhamanathi, a tributary of river Shanmuganathi (Executive Engineer PWD 1986, 20–33). The source of water for KAS comes from the Varadhamanathi stream. The stream originates in the forests of the Palani and Kodaikkanal hill ranges and receives its runoff from a catchment of 74.07 sq.km. The stream became a controlled flow through the interventions of building a reservoir at the head of the river in 1979 (Figure 8.2). Sluices and control works were established on the channels and the stream. So the stream was controlled from head to tail.

Historically, diversions from the stream was achieved through four *anicuts.* These were also fitted with sluices and made controllable. All 17 tanks together irrigate an area of 1673 ha, and another 433 ha is irrigated through direct sluices kept on these 4 channels[6] (Executive Engineer PWD 1986, 20–33). Until 1979, the stream was free flowing and filled the tanks as and when there is some flow. This ancient arrangement did not allow any manipulation of the flows into the dependent tanks.

The dam was built across the stream of Varadhamanathi to store waters in the reservoir. The reservoir project stated the objective was to stabilize[7] the existing

[5] This sub group of tanks are placed under the Shanmuganadhi group. The Shanmuganadhi group is part of the Varadhamanadhi irrigation system. Varadhamanadhi is part of Amaravathi sub-basin falling under Cauvery river basin.

[6] PWD history of the dam (undated)

[7] Stabilisation is a term used by the PWD to indicate the existing irrigation areas have some deficiencies that need to be corrected through some planned

irrigation of 2,107 ha done through the tanks. The dam was not expected to bring any new area under irrigation. Normally, the objective of building dams and creating modern reservoirs by the government during and after colonial periods in tank intensive areas was to 'stabilize' the existing irrigation and add additional areas[8]. However, in the case of Varadhamanathi reservoir, there was no such objective of bringing any new irrigation. The dam was intended to stop and store the flows at the reservoir at the top of the watershed, and expected to release it in a controlled manner (Chief Engineer, Irrigation 1984d). Hence, an ancient system with a free flowing stream having limited control mechanisms became a fully controlled flow system and managed by the PWD.

Prior to the reservoir building the PWD had no role to regulate the flows from the four *anicuts*. This could be said as the first technological intervention in the system. Like any stream that originates in steep hills, the floods in Varadhamanathi are flash floods, and occur mostly during the monsoons (Chief Engineer, Irrigation 1984d, 152 clause 4). The reservoir has become another storage facility built across the river. Since it is built at the top of the watershed it stores the water that belonged to the lower down tanks. The reservoir was not intended to hold all the waters that flowed into the stream, but designed to store 15 % of the total flows. The reservoir has a capacity of 108 MCft and the total yield in the stream is 720 MCft. In that way, the reservoir started storing water that belonged to the lower down tanks. Because of this technical arrangement, a system of control and water accounting came into place. This arrangement had

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interventions. Most of the reservoirs and other constructions in traditional tankfed areas are planned with Stabilisation as an objective.

[8] This phenomena is explained in detail while discussing the formation of many small reservoirs in the tributaries of Vaigai. Including the Cauvery, all river damming projects in Tamil Nadu, had existing irrigation done through tanks. Tanks get their water through their specific *anicut*s located on these rivers. Most such *anicut*s were simple masonry walls with limited or no adjustments to control or alter flows.

different implications for the tanks and the sluices directly irrigating the surrounding areas.

Photo 5 Weir of the Varadhamanathi reservoir

Photo 6 Diversion into Kothai anicut

Fig 8.2 Photographs of Varadhamanathi and Kothai Anicut Weirs

There are some obvious advantages in having such a dam. During peak monsoons when all the tanks are full the flood waters cannot be stored anywhere and may go unutilized. At such times the dam becomes an additional storage to capture such flood flows[9]. The rules of operation of the reservoir said that impounding of water in the reservoir is done during floods 'only after filling up of all the tanks[10] '. After filling up all the tanks the dam sluice is controlled in such a manner that 'sufficient flows will be delivered to the direct irrigation area' done through sluices[11]. The reservoir rules also stated all summer flows (estimated to be less than 15 % of total flows in a year) in the river will be fully 'stored at the dam'.

Thus the PWD in essence took over the control of water flows during the summer and at times of untimely rains by storing it at the reservoir. Summer and the end of crop seasons is the period when the user tanks are in high demand for getting water from the reservoir. The decision to release these waters to the tanks lower down is based on the standing crops at a given point in time that might need water. Hence, during scarcity when water levels are low in the tanks, it caused tensions and conflicts in managing the available water at the newly built reservoir. In dry periods and during second crop seasons, the tanks lower down, came into conflict with the operation of the direct irrigation sluices. The direct irrigated areas during summer seasons can (and do often) divert flows through the direct sluices when the tanks below are transferring the receding waters or small flows from the dam. Such conflicts arose *mostly* at the end of the cropping seasons; and at the final stages of the monsoon. The irrigation bureaucracy that

[9] Group discussions with farmers reveal a mixed response of having the dam. Some think that ever since the dam came into existence it helped their tanks, but some others felt that managing the irrigation department and the direct sluices on the way has become a nightmare.

[10] Clause-2 of the Rules of Operations (Chief Engineer, Irrigation 1984d)

[11] (clause-3) of the Rules of Operations (Chief Engineer, Irrigation 1984d)

now manages the reservoir thus becomes a crucial actor wielding technical and legal powers to control and manage the stored water on behalf of the tanks.

Since no new or additional irrigation happened because of the reservoir, it is debatable for whose benefit the dam came in the first place[12]. The opinions of the farmers are divided about the dam, some suggesting there are benefits of convenience; and others feel it became a controlled system taking away their waters through the bureaucratic control.

In summary, the changes in the stream made,

- an uncontrolled stream used by many tanks became a controlled flow
- tanks became subservient to fully controlled by the engineering bureaucracy (which was not the case before the dam).
- arrival of a permanent bureaucracy that overlords both the old tanks and new dam
- new and competing users such as the municipality for drinking water
- doing away with many customary practices with the traditional tank institutions

These may be considered as some of the sources of conflicts between the PWD and the tank farmers to obtain the water that originally belonged to them but now held at the reservoir. All tanks fed by the stream get into conflict with the PWD that may not appreciate the requirement of the tanks- specifically the time and quantity of release whenever there is a shortfall in tanks. This conflict developed because of the technical changes made in the larger system (Varadhamanathi sub basin) by having a reservoir at the head reach.

[12] After the dam was built, drinking water needs for the adjoining towns and villages are met from the water stored in the dam. Especially the summer storages are used. The original dam proposal did not aim to do so.

8.2 SALIENT TECHNICAL FEATURES OF KAS

The Kothai *Anicut* System (KAS) within the Varadhamanathi sub-basin comprises seven tanks and two direct sluices in all. Refer to the Figure 8.3 for the network of tanks and channels in Varadhamanathi project, and **Table 8.1** for the constituent tanks and sluices in Kothai *Anicut* System.

Table 8.1. Tanks and direct sluices in Kothai Anicut System (KAS)

Tank number	Name of tank and the village	Registered *Ayacut* (ha)	Storages in the tank per ha	Sources of water
1	Sinnakulam tank at Kothamangalam	150.28	0.01200	• Free catchment; • Surplus from tank no.2; • No direct supplies from the Kothai *anicut channel*
2	Pudukulam tank at Kothamangalam	combined with above	-	• Free catchment; • Surplus from four tanks found in three different adjoining chains; • No direct supplies from the Kothai *anicut* channel.
3	*Sirunaicken kulam* tank at Palani	54.45	0.01122	• Free catchment; • Surplus from tank no. 4; • No direct supplies from the Kothai *anicut*.

(Table 8.1 continued)

Tank number	Name of tank and the village	Registered *Ayacut* (ha)	Storages in the tank per ha	Sources of water
4	Vaiyapurikulam tank at Palani	312.40	0.01170	• Free catchment; • Direct supplies from Kothai *anicut* channel; • Direct supply from a sluice in tank no. 6
5	Karanthakottai (Syed Bua Tank) tank at Palani	2.39	Not available and insignific ant	• Free catchment; • No direct supplies from the Kothai *anicut* channel.
6	Idumbankulam tank at Palani	35.07	0.03200	• Free catchment; • No direct supplies from the Kothai *anicut* channel; • Surpluses from two tanks located in two adjoining chains
7	Kothai *anicut* channel at Palani	156.30	-	Direct irrigation
8	Palani Pappankulam channel at Palani	86.40	-	Direct irrigation and also from tank no.9
9	Palani Pappankulam tank at Palani	combined with above	0.01203	Free basin; Surplus from tank no. 3; direct supplies from Kothai *anicut channel*
		797.29		

Source: Tank memoirs of the PWD 1985. The memoirs were prepared during 1972-76 and printed in 1985 (Executive Engineer PWD 1986, 20–33)

As understood from the **Table 8.1**,

- In order to get their water, all tanks within KAS have their own free catchments. Along with that, they are
- either connected to the upper tanks (tank numbers- 1,2,3,5,and 6), or to the Kothai *anicut* channel (tank numbers- 4 and 9)

This technical arrangement implies that the inflows from the Varadhamanathi are important along with the supplies from the upper tanks. Unless the upper tanks become full and there is a surplus, the lower ones will not get any water. Also the performance of a tank upstream is crucial for the performance of the tanks lower down. For example, the upper tanks should not indulge in wasting any water; their sluices should be in good order; their bunds should be strong enough to hold high flows; and must hold sufficient storages.

Therefore, the performance of the constituent tanks depend mainly on two factors (i) the supplies from the Varadhamanathi, (ii) the physical conditions and performance of the upper tanks. Reduction of supplies from the stream as well as the poor conditions of the tanks, badly managed supply channels, encroached tank beds would affect their individual *ayacut*s as well as their lower down tanks. Reduction of water leads to conflicts among the tanks and also lead to conflicts within the *intra* tank users. The discussions made below investigates the conflicts occurring in two of the tanks named Vaiyapurikulam (tank number3) and Sirunaicken kulam (tank number 4).

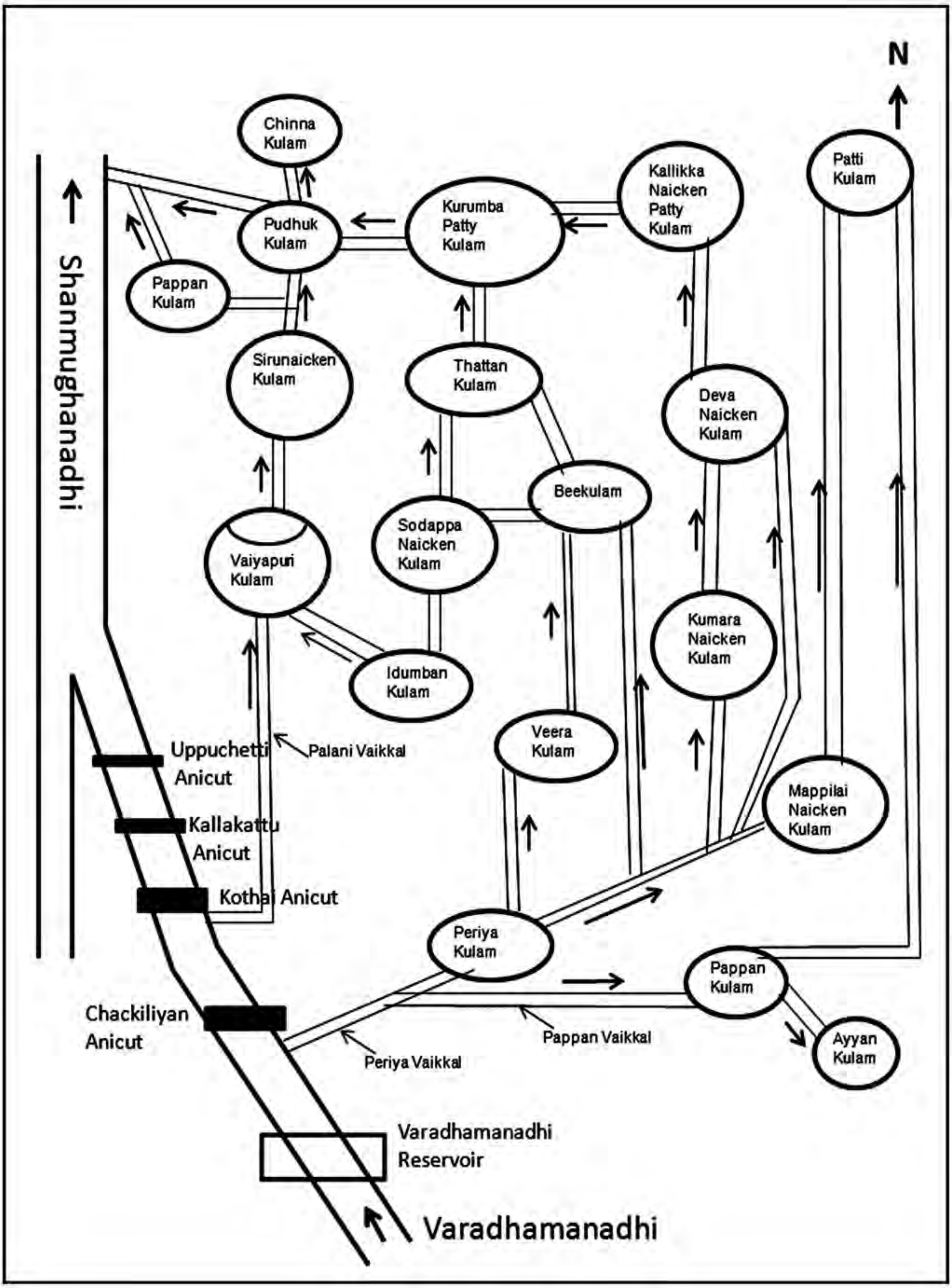
Features of Vaiyapurikulam and Sirunaicken kulam

Vaiyapurikulam and Sirunaicken kulam are the most important tanks (**Table 8.2**) in the Varadhamanathi stream and by the KAS. Refer Figure 8.3 for the location of these twin tanks and their surroundings. Together, they irrigate around one fifth of the total irrigated area fed by Varadhamanathi stream, and nearly half of all area within the KAS.

Table 8.2. Salient features of the tanks

Sl. No.	Detail	*Vaiyapurikulam*	*Sirunaicken kulam*
	Location	Lat 10 26 45N Long 77 30 45	Lat 10 27 37 N Long 77 30 07 E
1	Area irrigated in ha	312.40	54.46
2	Area of the water-spread in ha	86.62	18.09
3	Capacity of the tank (in MCM)	1.516	0.2268
4	Annual Storage (in MCM)	3.643	0.6645
5	Length of bund in m	2380	1005
6	Number of sluices	4	3

Source: Agricultural Engineering Department, 2011



Not to Scale

Fig 8.3 Network of Tanks and channels in Varadhamanathi project

Vaiyapurikulam has the lowest storage capacity of water per ha of its ayacut. This deficiency has been compensated for by water supplied from Idumban kulam, an upper tank through a dedicated sluice. Supplying water from a sluice is very different from getting it through a surplus weir. By getting supply from a sluice of another tank, the recipient becomes integrated with the supplying tank. Hence the farmers of Vaiyapurikulam tank also need to be concerned about the Idumban kulam tank as well. Though the records of the PWD and the Revenue Department suggests these two as separate tanks, in practice they act as a single tank. They are separated by a small wedge of land and a highway but no demarcation exists within the combined ayacut. The sluice levels13 of the upper tank permits irrigation of the lower tank's ayacut as well. The farmers claim such a practice is utilized at times of scarcity in the lower tank – the Vaiyapurikulam. Hence, farmers tend to treat these two tanks as one for the purpose of its water management and protection. Because of this technical and social features both are integrated. Such an arrangement once again shows that the ancient tanks like these are complex.

8.3 TECHNOLOGY AND THE RULE

According to Tank Restoration survey (TRS) memoirs, the Vaiyapurikulam draws water from three sources: (i) its free basin, (ii) from Kothai *anicut* channel and (iii) from a sluice in the upper tank named Idumban kulam[14]. Also the same is mentioned in the Village A Register and has legal recognition. Refer to **Table 8.1** for a details of storages held in tanks in the KAS. The arrangements are technically

[13]Vaiyapuri kulam tank has four sluices of which one is a vent on the weir with their sill level (bottom most surface of the sluice pipe) at 309.25m, 309.24m, 310.88m and 312.10m. Sirunaicken kulam tank has three sluices with their sills at 306.635m, 304.265m, and 305.785m. Since the command is contiguous the sluices from Vaiyapurikulam can technically irrigate the command of Sirunaicken kulam as well. Channels exist to convey water from one to another both tanks are considered as twins serving the command together.

[14](Executive Engineer PWD 1986, 27)

and managerially complex. For example, the supplying tank, Idumban kulam does not provide surplus overflows into Vaiyapurikulam tank, and any surplus is channelled into a different chain of tanks that is not connected with the KAS. An analysis of technical features show Idumban kulam stores 0.032 million cubic meters of water per ha, and all the rest of the tanks in KAS stores an average of 0.012 Million cubic meters per ha. Idumban kulam has a smaller *ayacut* compared to its storage capacity possibly because of a geographical constraint in delimiting the *ayacut*. There is a hill that restricts its *ayacut* and gives way only for a channel that leads to the Vaiyapurikulam tank.

This is a sophisticated technical arrangement – water in one tank and *ayacut* in another tank. Such a practice is observed in four other tanks in KAS. This practice of linking vertically up and down through special arrangements within a chain of tanks; and horizontally linking with other chains, has been observed in many other tanks in the whole of Varadhamanathi[15]. The arrangement in essence maximizes the water storage, water utilization and capturing the residual flows.

This practice shows there existed a sophisticated technological understanding of a larger geography going beyond a tank and its catchment and *ayacut*. The planning must have come from the elaborate understanding of the basin as a whole. By doing so, water availability per ha of *ayacut* is kept the same for most of the tanks. This technical arrangement and legal aspect (as recorded in the revenue records) maintains an equity in water availability across the different chains found in the Varadhamanathi system. This inference challenges many notions that tanks are simple and based on simple water harvesting methods. Also it differs from the understanding about pre-modern technological systems as inequitable as found by Shah (2003; 2008).

[15] The observation is based on the reading of the TRS memoirs for other chain of tanks in the Varadhamanathi sub-basin.

Organizational arrangements

Vaiyapurikulam and Sirunaickenkulam together have got, three formally organized farmers' associations. They are named as Karaippathupuravu Sangam, Maniyappathupuravu Sangam and Melkandappathuppuravu Sangam for these two tanks together. They have existed for several decades[16]. The elders, over seventy years of age, recalled the meetings of these associations held at common places including the tank bunds when they were children. The present leaders met during the study had claimed their own great grand fathers were active in these associations in their days as leaders.

The associations keep records and documentation[17] and function formally. The meetings are chaired by the President in a common place with anyone having the option of raising any issue in the open. They collect an annual levy of around forty kilogram of paddy per hectare per crop from the cultivators. This levy is equal to around 1 % or less of the yield from their cultivation. Irrespective of his status as an owner farmer or a tenant farmer every cultivator needs to pay.

The associations employ three types of functionaries and there are seven in all. They are *Neeranikkan* (water manager -3), *Kaval* (Watchman to guard the crops-3), and general worker-1. Irrigation is strictly done by the water manager and farmers are not allowed to operate the sluices or turn water into their fields on

[16] The word 'Puravu' means lands in the hills, forests and also farm lands. It could be translated in English as follows: *Karai-paththup-puravu* – lands adjoining the bund, *Maniya-paththup-puravu-* lands that are exempted from taxes, *Mel-kandap-puravu* – lands on the upper sections of the command. As of today, these associations have most of their membership based on the three main sluices of the Vaiyapuri kulam tank.

[17]Petitions and court affidavits were submitted in these names. Also at this time, these associations are registered as societies under the *Indian Societies Act 1860*.Karaipathupuravu association has a certification of incorporation and other records from the year 1956.

their own. However, the cultivating farmers can prompt the *Neeranikkan* to do the job properly after visiting their fields.

Of the levy collected from the cultivators, fifteen kilograms each is paid to the water managers and watchmen, and the rest ten kilograms is paid to the general worker. For expenses such as repairs to sluices, gates, paying illegal payments to officers, petitioning government offices, and court expenses they make separate collections. Annually, around ten tons of paddy was paid to around 7 water managers and the watchmen (came from specific families) in the main cropping season. If the second season is successful they get almost the same. Around 4 tons of paddy is sold out and used to pay the staff who works for the association.

It is not that these three associations functions all the time in unison. They too had their squabbles among themselves in the past. One such conflict arose out of some tank modernization work done by the PWD in 1967 and resolved after litigating to resolve a change made in the sluice by the PWD[18].

Tank rehabilitation projects at that time built new sluices and improved the tank bunds of these two tanks. All 3 sluices on the bund of the tank were rebuilt. At times of water scarcity, sluice no.1 (called as Pathar Madhagu) used to irrigate a part of the land under sluice no.3, (called as Vannan Madhagu). There was a separate channel meant for this purpose. While reconstructing the sluice a separate vent in the division box was made and through which water flowed into this channel. Structurally the new arrangement is different when compared to the previous arrangement. Farmers belonging to the sluice no.1 objected to give them such a separate vent. By denying a vent, they effectively prevented separate flows from the sluice no.1 to areas fed by the sluice no.3. The users of the sluice represented by Karaipathupuravu association (users of sluice no.1 and 2) wanted the District Court to order the closure of the sluice by staying against the users of

[18] Murugaiyah Thevar v The State of Tamil Nadu, Velu Pillai and others. Second Appeal no.s 1225 & 1226 of 1978 in the Madras High Court.

sluice no.3 (represented by Maniyappaththu association). The court upheld the customary practice and ordered that the vent must prevail. The second appeal went to the High Court which also accepted such a customary practice existed and the changes in the sluice as valid. Even though these associations squabble among themselves they have functioned in unison to protect the larger interests of the tank that was affected by government interventions after the 1980s.

8.4 SERIES OF CONFLICTS IN THE TWIN TANKS

This section will detail the series of conflicts arose between the user farmers and others including the government departments & encroachers. The conflicts have their origin in the unplanned urban growth and growth of public transport systems in the region and the town. Further, the phenomenon of encroaching public lands, and populist demands in support of them aggravated these conflicts. The tank farmers constituting about one tenth of the town's population had to fight to keep their livelihood of farming and tank alive. Different types of conflicts and the actors involved are provided in the **Table 8.3**.

Table 8.3. Nature of conflicts in the twin tanks

	Action	**Actors involved**
1	Dismantling a portion of tank for building a new bus stand	The municipal council (Government); Temple Administration
2	Encroachments on portions of tanks for houses and amenities	The encroachers (private and also some state institutions)
3	Discharging urban sewage and dumping of solid wastes	The municipality (state)
4	Dumping of construction refuse	Unscrupulous individuals

On the face of it, all the above four actions have no legal basis[19] and can never be permitted. These actions apply to most tanks in the urban fringes or inside the urban areas. However, the Municipal Council, and the Temple Authorities claiming they had no alternatives left to serve the public and the many thousands of pilgrims visiting the town. The Revenue Department and the PWD that were supposed to protect the tank property by preventing encroachments and other abuses such as pollution did not bother to do their mandated duty as listed in the BSO and related encroachment laws as discussed in chapter 4. The timeline given in **Table 8.4** is constructed using available petitions, correspondences and other papers, court judgements and farmers' discussions and provides evidences for the lack of enforcement.

Table 8.4. Timeline of conflicts

Period	**Activities**
Since 1965	• Temporary sheds for horses, bullocks, hay stock, pens for sheep, and hutments came up on the margins of water-spread. • But, no harm to the tank at this stage.
By 1975	• Sewage discharge into the tank by the municipality. • A public lavatory complex built inside the water-spread. • Farmers objected to such pollution in writing and by agitating.
Early 1980s	• The businessmen and holy men from the temple, and politicians mooted the idea of taking over Vaiyapurikulam tank water-spread. • Municipality resolved 16.11 acres of the tank bed will be taken over by them and wanted the government to approve it.

[19] Refer to detailed discussions made in the chapter 5 and 6 about the BSO and other laws affecting tanks. Simply stated the BSOs, encroachment laws, and pollution control laws do not allow all the above said actions.

(Table 8.4 continued)

Period	**Activities**
1985 – 91	• The temple authorities built a facility on one side; • Municipality built some more drains and patch of a road into the tank dividing the water-spread; • Bus stand was extended into the tank bed. • Countless petitions were sent by the farmers. No result.
Feb' 1992	• Farmers moved the Madras High Court to order the government to stop all such actions. Court ordered a notice but no relief given.
	• Fearing the court may not approve as it found to be blatantly illegal, all works by the government and the temple were halted. • The encroachers also petitioned the court to regularize them.
Oct' 1994	• A compromise meeting between farmers, legislators, and the government arrived. Farmers were made to accept giving away only 5.25 acres of tank water-spread just for the Bus stand. • There were six conditions attached including eviction of all private and government encroachments.
Dec' 1995	• The High Court ordered a stay of all activities inside the tank.
Apr' 1997	• Interim order of the court allowed 2.1 ha of tank bed to be used for the bus stand based on the agreement. Further, it ordered to remove all private and public encroachments. • The bus stand work commenced in an area of 1 ha.
Nov' 1998	• Final Orders of the court wanted to evict all encroachments and improve the tank. • No mention about issues such as pollution. • The plea made by the encroachers was summarily dismissed. • PWD handed over 2.1 ha of tank bed land to the Municipality

(Table 8.4 continued)

Period	**Activities**
1998-2007	• The agreement with farmers was not honoured. • Encroachments thrived, tank was not deepened, and storage was not compensated. • Farmers started petitioning and agitating.
	• Several petitions sent seeking attention to rehabilitate and compensate the loss in storage by special projects.
Jun 2007	• After several petitions, agitations, and threats to pursue the matter in court another agreement was signed between the government and farmers. • It was agreed to rehabilitate the tank, clear all debris from demolition of the encroached buildings.
Nov 2007	• A special project arrived by using the agreement with a fund of Rs 4.3 million to deepen the tank and evict the encroachment. • PWD claimed to have utilized the funds in full. • Farmers found the work unsatisfactory and encroachments were not evicted. • Sewage discharge and solid waste dumping increased due to the bus stand and other establishments surrounding it. • Encroachers built good houses in their piece of lands.
2008	• Writ petition filed to implement the earlier order of the High Court by the farmers
2009	• A contempt petition filed for not implementing any of the court orders. • The 500 encroachers formed an association and filed a separate petition seeking the court to regularize their encroachments. They pleaded the court to consider their plea on a humanitarian basis, citing some previous judgements.

(Table 8.4 continued)

Period	**Activities**
Dec' 2009	• The High Court ruled to remove all encroachments within the next six months. • The court did not find any contempt by the authorities. • Gave an option to the farmers to come back to the court after six months, if in case the orders are not implemented.
Apr' 2010	• Encroachers had gone on appeal to the Supreme Court of India in New Delhi to get their encroached land regularized.
	• The case is still pending at the Supreme Court pending resolution. The farmers have also appealed not to favour the encroachers.
Jan' 2012	• All the problems for which the court battles and other protests have begun remain unresolved. • Irrigation became very difficult towards the end of cropping seasons.

Tank Conflicts over the bus stand

The damage to the tank and the consequent conflicts started with a clamour for making a convenient bus stand for the thousands of pilgrims arriving in Palani every day. The business interests mainly the leading shops selling *Prasadam* (sacraments)[20], wanted a centralized complex having a bus stand, station for public and private vehicles, closer to their establishments. The *Pandarams* (holy men) of the temple desired public lodges and additional facilities such as multi-

[20] Palani is the richest of all temples in Tamil Nadu administered by the government. There are hundreds of businesses sell sacraments to the pilgrims. The officials met claimed, the temple and related businesses could be the biggest of all industry in the town. Traditional industry of the town the rice mills, coconut based industries are on the decline.

storeyed buildings for tonsuring heads[21] closer to the temple. The government servants and the temple employees wanted their quarters closer to the temple. Army ex-servicemen wanted a commercial complex for their fraternity who are visiting the temple from other places. Combining all these requests, and ideas the Municipality made proposals to the government to seek and sought an area of 6.4 ha of the Vaiyapurikulam tank bed[22]. Since the tank is located on the foot of the hill and most of the temple establishments bordered the tank bund on the southern side, the authorities thought if a part of the tank bed is taken over everything they desired for can be done at one place.

Encroachments on the tank bed

While the authorities planned to take a part of the tank bed, various types of encroachments came into existence on the margins of the water-spread in both the tanks. Initially, they were for the transporters to park hundreds of horse carts, bullock carts and motor vehicles who brought pilgrims to the temples. Temporary huts sprang up for cattle and they became permanent houses over a period. In that way, in both tanks from one end to another, for a length of around 3 km rows of such encroachments came into existence. Every now and then such encroachments were removed after agitations by the farmers but they would come up by again. By late eighties, these temporary structures started becoming permanent buildings. As the businesses around the temple grew farmers have become powerless and their political base got marginalized to muster any political support. One leader said of this transformation,

> 'farmers had thousand things to bother about their crop, prices and so on... these encroachers have nothing to bother about... they went on

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[21]Based on the Focus Group Discussions (FGD), and several petitions sent out by the farmers association objecting their tank chosen for such a place.

[22] Clause -1 of the agreement signed between the Farmers, legislators, and senior government officials on 13th October 1994.

without any check... How long you fight them...you will get tired after some time[23].'

The encroachers thus have become a force and threatened the very existence of the tanks. This had brought the tank farmers into direct conflict with encroachers whose motivation was to gain a parcel of land for them.

8.5 Respect for law and the technology: The court cases

The private encroachers could not be questioned by the same authorities in any stronger terms because the government itself was engaged in taking over parts of the tank for building Bus stand. The municipality started filling up a part of the bus stand without waiting for any procedure as specified in the BSO to be completed.

8.5.1 Round 1 of court cases: 1992-98

The farmers went on protesting to stop the government as well as the private encroachers without any result. After a period of ten years of protests the farmers reached the Madras High Court seeking a writ of Mandamus[24] to stop the encroachments as well as the municipality's actions of filling up the tank bed. The farmers' case[25] was that the (i) the municipality had no authority to take away any part of an irrigation tank and (ii) the Revenue Department and the PWD with legal responsibilities to safeguard, and maintain the tank did not perform their legal

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[23] Chockalingam, President of Karaippathupuravu Association. Interviewed on 14 February 2012.

[24] High Court and the Supreme Court shall order a public authority to perform a statutory duty. This is normally done to secure the performance of public duties and to enforce private rights withheld by the public authorities like the Irrigation department, Municipality and the Revenue Department.

[25] *The Agriculturists Associations of (i) Karaipathu, (ii) Maniyappathu, (iii) Melkandam V Government of Tamil Nadu represented by (i) Revenue Secretary, (ii)District collector, (iii) Executive Engineer, PWD, (iv) Palani Municipality. W.P.No.10137 of 1992 In the High Court of Madras.*

duties. Farmers showed in court that these acts of the authorities caused their water storage to fall, creating problems for their livelihoods. It took nearly two years for the High Court to appreciate this simple and straight forward plea[26].

After some hearings, the authorities realized the court may not appreciate their point of view. So they started coercing the farmers through senior government functionaries and legislators (Member of Parliament and the Member of Legislative Assembly) to come to an agreement. The trap (as expressed by a farmer) was laid that all private encroachments (in hundreds of parcels within the tank bed and bund), will be removed if the farmers agree to part with 2.1 ha of land for the bus stand. The farmers tried to ensure that the agreement stipulated that *the storage* of the tank will not be reduced. The conditions on which the farmers agreed to part away the 2.1 ha of tank bed were as follows: (i) No further tank water-spread will ever be acquired from these tanks, (ii) all proposed works – tourist bus stand, officers' quarters etc., should be dropped once for all; (iii) all encroachments will be found and evicted before 30th April 1994 by the Irrigation and Revenue Department; (iv) a part of the tank will be deepened and the same soil be used for filling up the bus stand; (v) no sewage discharge into the tank from the town and also from the bus stand.

So, they were promised that any storage lost by way of reduction in waterspread area will be compensated by excavations. This excavated earth in turn was to be used to fill and raise the land for the bus stand. However, the PWD that is responsible to do this work did not produce any technical assessment of how such a possibility will be achieved.

The court stayed all the actions of the authorities after three years of their original petition[27]. The authorities produced the agreement in Court and

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[26] Delays in court cases in India are very common, and it is difficult to say what was the rationale for the Court to prolong this instant case for such a long period.

[27] Interim injunction dated 18 November 1995, in W.P.No 14672 of 1992.

requested the stay be removed. Hence, the court allowed them to proceed with the bus stand[28]. The authorities again highlighted the bus stand project is part of a World Bank urban project which need to be completed in time to avoid losing external funds. The court ‘agreed with the importance of such a project and allowed’ to proceed based on the agreement made with farmers. However, the question of compensating the ‘lost storage’ never figured in the court’s interim orders. A part of the bus stand was completed well before the conclusion of the case[29]. In short, whatever the government desired to do with the tank bed to build the bus stand materialized. However, the promises were not kept by the government. Farmers with all their agitation and court interventions achieved very little in implementing whatever the laws say on paper.

8.5.2 Round 2 of Court Cases: 2007-ongoing

The Highways Department was entrusted with the construction and formation of the Bus stand. Though the agreement was to deepen a portion of tank bed to fill a place for the Bus stand, the department did not want to excavate the tank bed to fill for the bus stand. It claimed the soil was not of good quality for making the base and foundations for the bus stand. Hence, nothing specified in the agreement was met with respect to create additional storages. The storage lost due to the bus stand was never recovered even after ten years. Due to rising water shortages in the tank, the farmers’ struggle for irrigating their lands reached its peak in 2007.

The PWD claimed no funds were available with it, and so they could not provide the promised compensation of storage. Realizing another court battle is likely, the government and the legislators came again, to negotiate another agreement as they did in 1994. This time the agreement was made between the farmers’ association and the government to (i) evict the encroachment in a time bound

[28] Interim order dated 22 April 1992 in W.P.No.14672 of 1992.

[29] Order dated 17 November 1998, dated W.P.No.10137 of 1992.

manner; (ii) stop sewage entering the tank; (iii) form a committee to monitor eviction of encroachment and oversee all the previous agreements; (iv) deepen the tank to bring back the original capacity; (iv) safeguard the tank from new encroachments[30].

The farmers were asked to wait until some funds came from central government to create the lost storage and evict the encroachments. Though irrigation development is the role of the state government, there are irrigation development schemes that provide funds from the central government on a project to project basis. A fund of Rs 4.3 million was provided to the PWD to execute the works specified in the agreement. The funds were said to have been utilized within a few months of the commencement of the work[31]. The department claimed it had completed and done the work. However the farmers claimed no such deepening work happened.

Similarly, the municipality had received an additional amount of Rs 6 million for a project to avoid letting drainage into the tank[32] and said the works would commence before end of 2007. But the work did not happen and sewage continues to enter into the tank.

Understanding the storage is lost once for all, the farmers' associations made a technical plea that they should be supplied water directly from the Varadhamanathi reservoir. The President of Karaippathupuravu Sangam[33] wrote a

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[30] Agreement signed on 6th June 2007 between the farmers and the senior district level government officers, Member of Parliament and Legislature Assembly and the Municipality. The document is available with the farmers' association.

[31] Letter dated 28th august 2007, the President of the Association wrote to the District Collector not to release any funds to the contractor since the excavation was not done as per proposal. Failing which he warned to move the court.

[32] Letter no.03465/07/C2 from the Muncipal commissioner of Palani.

[33]Letter dated, 1st June 2007 to the Chief Minister of Tamil Nadu from M.Chockalingam, President of Karaipaththu Association. He wrote, "As farmers

sarcastic letter and suggested their twin tanks be taken over by Municipality to fill it with filth and squalor and release water from the dam directly through a channel. At this stage in late 2007, the farmers sent a fresh legal notice for not implementing any of the earlier court orders[34] and filed a writ petition with the High Court[35]. The Court ruled that the government consider farmers' petitions and respond quickly. Even after this direction given by the Court, nothing moved on the ground and the farmers filed a contempt petition[36] for following none of its earlier orders and directions.

Meanwhile, in 2007, the Municipal council unanimously resolved[37] to give away the tank bed that is encroached by around 400 encroachers[38]. Municipalities are vested with all public water works, springs, public reservoirs, tanks, etc., are in their limits. However such powers are only for the purpose of maintenance of the irrigation functions and not to dispose a tank. In 2008, however, a bench of the Madras High Court[39] has ruled such resolutions passed by Municipalities to

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we never want to be a nuisance for the thousands of pilgrims coming to this holy town. We are humans. We make a living only when our lands are irrigated....so, hand over the tank once for all to the Municipality. They will do as they please... They already built a lavatory, and are sending sewage to fill the tank".

[34] Legal notice sent by the three associations to the District collector, Executive Engineer, and the Municipal Commissioner on 26 September 2007.

[35] *Vaiyapurikulam Karaipathuppuravu association v the District Collector of Dindigul. W.P.No.3679 of 2008, In the Madras High Court at Madurai.*

[36] *Vaiyapurikulam Karaipathuppuravu association v the District Collector of Dindigul. Contempt Petition. No.302 of 2009 of Madras High Court in Madurai.*

[37] *District Municipalities Act 1920, s.125*

[38] Resolution number 269 of the Municipal council dated 20 April 2007. The council unanimously resolved to give away the lands to around 400 families encroached for housing.

[39]*Sivakasi Region Tax Payers Association v State of Tamil Nadu [2008] 5 MLJ 1425 (Mad).* In a similar situation, in Sivakasi Municipality, the Madras High Court ruled that the government actions in regularising certain tank encroachments can be

dispose tank beds that are dysfunctional as valid. Bolstered by the Municipal resolution and the judgement the encroachers went to court[40] seeking a writ of mandamus to regularize their encroached parcels.

The two petitions filed by the farmers and the encroachers were heard by the High Court with a verdict in December 2009. The Court observed encroachments as a disease on the tanks that need to be treated if the tanks are to survive for the future of agriculture. The plea made by the encroachers were not accepted, and the Court ordered them to vacate on their own or else face eviction with the use of police force. The court also said 'these encroachers, on their own, to vacate their occupation, so that the irrigation tanks can be restored to their original position'. The judges observed

> We would like to say that administering an injection on a patient is painful to him, nevertheless, the patient has to bear the same, if the disease has to go. Likewise, removing these encroachers, who have been in occupation for more than two decades, is really painful but, the authorities have no other option to avoid to do so. We only expect that these encroachers, on their own, vacate their occupation, so that the irrigation tanks can be restored to their original position and we also expect the Government to rehabilitate these encroachers, in a suitable place, without any loss of time". (Para 25 of ibid)

Since the conflict has lasted for the last thirty years, the judges reluctantly hoped, to comply with their order. They said,

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allowed. It stated,"..if the State Government takes a conscious decision to regularize certain encroachments, which have continued for a pretty long period after the appropriate authority comes to a conclusion that such land is not required for any public purpose or for the State" such regularisations be allowed. However, this ruling was struck down by the Supreme Court on appeal in 2011.

[40] *Uppliyanthittu Kamarajar Nagar Residents Welfare Association v The District Collector of Dindigul. Writ Petition no. 7552 of 2009 of the Madras High Court in Madurai.*

> "This direction [to remove all encroachments] has not been so far complied with by the respondents [government] from 1998 onwards. Instead, as pointed out by the learned counsel for the petitioner [farmers] in the contempt petition, the respondents [government] have been going on providing all facilities to these encroachers so as to encourage their encroachments. Though there are materials to pursue further in the contempt petition against the respondents, we do not propose to do so, in view of the peculiar facts and circumstances of the case, as we have narrated above, on the fond hope that at least the order which we presently pass would be complied with (para 22 of ibid)".

As they guessed, the authorities did not comply with it. All encroachments currently remain as it was.

In 2010, the encroachers went on appeal to the Supreme Court and the authorities responsible to evict encroachments claimed they will not act until the Supreme Court decides the case. Though there exists no bar in evicting the encroachers, the government did not act on the judgement. The farmers have once again gone to the Supreme Court to plead for eviction and saving the tank. The dejected President of the Association said,

> 'Farming will end with us..It is good to pay lip service by saying farmers are the backbone of this country. It is good to talk...They speak so lovely...But see what our status is[41]'.

It is clear that the government does not want to evict the encroachers and protect the tank from encroachment and other problems. As it stands in February 2012,

- The Municipality has occupied whatever they wanted originally in 1990. The deepest portion of the water-spread estimated to be around 6 ha is taken away from the tank[42].

[41] Interview with M.Chockalingam on 24 January 2011

[42] Letter dated 1st June 2007 to the Chief Minister of Tamil Nadu from M.Chockalingam, President of Karaipaththu Association.

- The encroachments expanded and grew into a small township of over 500 houses in the water spread; and at least two rows of establishments came up in the water spread.
- The Municipality dumps its solid wastes and discharges sewage without any check. The tank receives sewage[43] that is several times higher than in the past.
- The town residents continue to dump their construction wastes in the tank bed.

The farmers estimate the lost storage is around one third of the total[44].

8.6 CONCLUSION

Though the tank irrigation did not come down in any significant measure in these tanks the difficulties to take a successful crop has increased. Farmers feel the PWD needs to be requested repeatedly to release their share of water for two main reasons: (i) the flows from the Varadhamanathi stops in the reservoir and controlled by the PWD; (ii) original storage capacity of the tank has gone down due to reduction in waterspread, and the encroachments. Had the reservoir not existed farmers would not have been forced to seek the bureaucracy every season to get their water. The technical arrangement of the past would have ensured that water reached their tanks without manipulation.

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[43] A town planning project document notes the following: "The town is provided with an existing UGD [Under Ground Drainage] system covering 15 % of the total town area. In the uncovered area the sewage, sullage and rainwater is let out into open pucca drains, which exist for a length of 92 % of the total road length. The drains discharge the untreated sewage into Vaiyapuri tank and Sirunaicken Kanmai causing pollution to these water bodies" (Palani Municipality 2008, x).

[44] The farmers claim the portion taken away is the deepest of all places, and they realise 20 days of water storage has reduced after the bus stand. As per memoir, the tank once filled would last for 60 days without any new arrival of water. The claims seem to be credible.

The case study shows how interventions made in the form of a dam and reservoir and changes in the management of the KAS channel affected the twin tanks negatively. The problem of water shortages is very regular and noticeable. The usual flow of summer waters stopped at the dam would otherwise reach these large tanks. Presently, the farmers are forced to petition during every year to release the summer flows. The taking over of the tank bed for extraneous uses such as the Bus stands further reduced the storage. The sewage discharge added to the problems and contaminate the water. Once a holy tank used to take a dip by pilgrims now became a hazard.

The courts were approached by the tank farmers as a last resort to implement 'what exists in the statutes' is not honoured repeatedly. Though the courts found in favour of the tanks repeatedly, the discussion shows that no meaningful remedy is made available for the tanks. Rather the prolonged court actions itself were used by the government and the encroachers to promote their cause in further destabilizing the integrity of the tank system. At no point in time, did the government take notice of the fact that tanks are systems that require certain specifications to be maintained in order to function properly. Even when the farmers wanted a technical solution the courts could not offer them as part of their ruling to maintain the storage. They did not consider any alternative proposed by the government and did not evaluate the government action for its worth during the litigation.

Even after three successful litigations in the High Court by spending huge resources for the lawyers and their own time, the farmers could not succeed to *implement the law as it exists* in paper. At one level, the issue is symptomatic of the present day 'rule of law' as experienced by the weaker sections of the society such as the farmers; and at other level it is the very least appreciation about the intricate technological aspects of traditional systems. The understanding that the tank as a piece of land rather than a technological system drives the courts and the government. Law is yet to fully understand the tank technology.

9. IS TANK A TECHNOLOGY OR A LAND PROPERTY? VIEW FROM THE MICRO LEVEL CONFLICTS

This chapter analyzes the local or micro level tank conflicts and the way they are dealt by the courts and the government. I attempt to present the 'most local of local' so that we get an account of the conflicts and their resolution in courts at the micro-level. I argue that (i) the law takes a simplistic view that tanks (including sluices, weirs and channels, trees, fish, silt, sand and other benefits obtained from tanks) as appurtenances of landed properties defined and held through property rights; (ii) technological integrity of tanks are least considered when conflicts come for resolutions; (iii) the documents (and the documentations) issued for tanks under the land revenue laws continue to be problematic; (iv) the government role in resolving the conflicts is limited to solving immediate problems rather than attending to the systemic issues. This chapter builds on the macro level and meso-level conflicts discussed in chapter 7 and 8.

All the conflicts taken up here for discussions have reached courts (Annexure 14) and selecting them is a deliberate choice that I have made. In order to limit the boundaries of discussions, I prefer to take those points raised in the litigation and known from the court judgements pronounced by the courts. The conflicts selected here are of local in nature - say *inter* village, *intra* village, and *inter* tank and *intra* tank and many have been long running i.e. for decades. In many ways, this chapter discusses the 'most local of local detail' related to tank conflicts.

This would help us to understand the nature of law that was introduced and still practiced in Tamil Nadu since the days of colonial rule. Undoubtedly local negotiations do take place between many villages in sharing water whenever there are problems of scarcity. An example of such local negotiation in resolving a conflict and finding a new solution is also taken up for discussion.

9.1 THE COURTS AND THE PROCESS OF LITIGATION

This section introduces the court system and the land documents on which the courts and the government rely for arriving at their judicial and executive decisions respectively.

In the early years of British administration, land revenue administration and the court systems were handled together by the Revenue Department. As Wierner points out in colonial India, "the law was very much a part of the governmental machine (2009, 137)". This machine at the operating level was handled by the District Collector who was an executive of the East India Company's (EIC) government. By the middle of nineteenth century the judicial and executive functions of land administration were separated and handled by the District Courts and District Collectorates respectively (Cox 1895, 237). Presently, for the purposes of land revenue administration, a district is subdivided into Revenue Divisions headed by a sub collector or a Revenue Divisional Officer (RDO). The Revenue Division comprises two or more *Taluks* headed each by *Thasildar or Thasildar.* The *Taluk*s are further sub-divided into *Firkhas* headed by Revenue Inspectors (RI).The *Taluk*s are the key offices responsible for land revenue administration and generates most of the documents through the village level officers. A *Taluk* typically comprises several villages headed by the Village Administrative Officers (VAO) who are supported by *Talayaris*, also known as village servants. While most officers above the VAO come from centralised government recruitment and hold transferable positions, the *Talayaris* come from within the local village. Apart from their land administrative powers the district collector, sub-collector and the *Thasildars* do have some judicial powers with respect to some aspects of land survey, and land documentation in their jurisdictions.

The court system within the district is parallel to the land revenue administration system. Generally, the disputes related to tanks are considered as civil in nature-occurring within the state or district, or between or among the citizens or between the State and citizens. There are three levels of civil courts within a district. They are the District Court at the district level, Sub-Court at the sub-divisional level and the Munsif Court or *Taluk* Court at the *Taluk* level (Menon, *et. al* 1984).The Sub-Court and the District Court as courts of first instance have original jurisdictions in tank disputes as well as appeal jurisdiction;[1] and the High Courts[2] and Supreme Court have only the appeal jurisdictions in matters related to land disputes affecting tanks. The High Court and Supreme Court rulings set precedent, and the lower courts must follow.

The value of the suit is fixed based on the land value for which the suit is being filed. Presently (in 2012), the civil suits valued up to Rs 100,000 are heard in *Taluk* Courts and the suits valued between 100,000 to 200,000 are heard in the Sub-Courts and those valued above this are heard by the District Courts. The valuation in tank related cases is estimated from the value of the land, where the disputed piece of tank's part exists. For example, Fischer's suit in 1895, affecting the entire lower Vaigai region (with over 140,000 acres of tank irrigation benefitted by the river) was taken on file by the Madurai District Court just because the *anicut* fell

[1] The judicial system of Lord Cornwallis based on the ideas of separation of powers between executive and judiciary. It was introduced in Madras Presidency in 1805, and until then the district Collector though an executive of the company's government exercised both the judicial and executive powers. The appeals were heard by the EICs' Board of Revenue at Madras. From 1805 to 1816, a Provincial court at Madras, and *Zilla* courts and a native Commissioners' court in the districts started functioning. The native commissioners were abolished by 1816 and the provincial and *Zilla* courts were established. By 1843, the system was again reorganised and the Civil Court and Sub-ordinate judge's court were introduced (Rao 1984, 68). Since then, there are minimal changes in the court structures except that another layer of civil courts named District Munsif courts below sub-courts at *Taluk*a level.

[2] The High Court in Madras came into existence in 1861, and prior to this period (1800-1861) Madras had a Supreme Court to hear any appeals from District Courts. Appeals from this Supreme Court (of prior to 1861) and High Courts (established after 1861) were heard by the Privy Council in London. A federal court was established by the government of India in 1935 to hear the appeals from High Courts. This federal court was abolished and a single Supreme Court of India was established in 1950. Source: Available at www.supremecourtofindia.nic.in/supct/scm/m2.pdf [Accessed 02 January 2013].

under a village within Madurai district. Like all civil disputes involving landed property, tank related disputes are also valued financially and dealt with by the civil courts for resolution. Even though the tank is a government property, the court fee for entertaining the petition must be paid by the plaintiffs (the petitioners) on the basis of the value of the piece of the land. The value of water that flows therein is immaterial for the court.

The proceedings of court in general and lower courts in specific are often slow and can get delayed even for decades for many reasons. Delaying the resolution is also used as a tactic by parties in these litigations[3]. Studies on Indian court systems and litigations report many reasons for delays in court proceedings. The procedural laws as introduced by the British rule is identified as one major reason (Cohn 1990). Going beyond the law, Mendelsohn finds the 'Indian judicial process' itself as a pathology of a legal system. For him, "the proceedings are extraordinarily dilatory; a single issue is often fragmented into a multitude of court actions; execution of judgements is haphazard; the lawyers frequently seem both incompetent and unethical; false witness is commonplace; and the probity of judges is habitually suspect (Mendelsohn 1981)". Added to these, the reports of the National Law Commission of India find inadequate number of judges and courts at all levels[4] are also some reasons for delays.

9.2 THE PROCESS OF LITIGATION

The process of litigating to succeed in a tank conflict itself is complex and involve substantial financial resources to pay for the lawyers and time of the litigants. The cases related to tanks involve some basic aspects about who can represent a tank

[3] Cases discussed in chapter 6 adequately show the government as a party adopts delaying the resolution as a strategy. Porur tank case, and Buckingham canal case are some classic examples of this and in the end no resolution could be drawn after several years of painful litigation by parties.

[4] See Report No.77 of National Law Commission of INDIA "Delay and arrears in trial courts - Law Commission of India" Report No. 79 for delays in High court and Supreme Courts and Report no.245 on Criminal Trials. Reports available at http://lawcommissionofindia.nic.in/ accessed 24 November 2014.

when there is a conflict. In law, as we know, the tanks are the properties of the government[5]. The rights and obligations of land holders are defined in the various land settlement regulations, the Revenue Board Standing Orders (BSO)[6] and other legislation. These laws do not define who else other than the government can litigate on behalf of the tank.

For example, consider a dispute about taking water from tank A to tank B through a sluice by a group of farmers belonging to B, which is objected by all the farmers in A. Tank B might claim certain reasons for taking the water. So a dispute develop. Theoretically speaking, both tanks are owned by the government and ideally the government agencies and officials responsible to maintain and manage the tanks must act. That may not happen in all situations. When that does not happen for any reason farmers of Tank A may prefer court action to resolve the issue. In this situation, the suit must be filed by farmers belonging to A as a representative suit substantiating their legal right for water. Also, they must choose their opponents (from B) for suing them, and have to substantiate their *locus standi* in court that they do represent their opponents collectively. In many of the cases discussed in this chapter the defendants are sued as representatives and the plaintiffs must substantiate the defendants' legal status. In all the cases discussed here, this issue of establishing *locus standi* is raised by the parties.

9.3 The systemic issues: Tank records as Problematic

The necessity of accurate documents is highly important to take the tank disputes to Revenue Authorities and the Courts. The documents related to tanks may be divided into two categories and issued by the Revenue Department. They are (i) documents about the tank as a system, and (ii) documents dealing with individual

[5] *Tamil Nadu Land Encroachment Act 1905*, *s.2* defines tank as a government property.

[6] Chapter 5 discusses Board Standing Orders.

property rights on parts of tanks or channels (such as *Patta or* conditional *Patta)*[7]. Three different public records of the Land survey, and Revenue Departments are kept at village level and considered to be important and decisive in resolving tank conflicts. Their important shortcomings are shown in **Table 9.1**.

Table 9.1. Important land revenue documents related to tanks

Sl. No.	Details [type of public record/document]	Shortcoming [contents of public record/document]	Remark [problems in establishing rights]
1	Village Maps in a scale of 1:5000	• Drainage lines for all the survey numbers (for the entire village) is not fully marked; • Smaller supply Channels and most of the field channels inside the *ayacut* are not fully marked	• Changes in maps[8] affecting someone or a group of landowners leads to conflicts

[7] *Patta* is a document evidencing 'lawful possession of the person concerned'. The holder of a *Patta* is called *Pattadar*. *Patta* is usually issued by the government Revenue Department in a format that depicts the exact locations, extent of land, type of land with a survey number. In case of trees, fishery and other usufructs the conditional *patta* may depict the type of use or the number of trees etc., There are also *pattas* issued for cultivating tank water-spreads, channels and bunds with specific conditions attached to it. All type of *Pattas* including conditional *Pattas* are transferrable.

[8] Routine and normal changes in the maps shall be made by the Thasildars with the recommendations of the VAO. Periodic updates of maps are done by the Revenue Department through special surveys – last done in 1983.

(Table 9.1 continued)

Sl. No.	Details [type of public record/document]	Shortcoming [contents of public record/document]	Remark [problems in establishing rights]
2	A-Register of the village. It is maintained by the VAO and updated by the Thasildar based on his report	(i) Abstract of the register shows where the water to a tank comes from and where the surplus water goes to (ii) For every survey number the register lists down the *pattadar*s and the nature and type of lands (iii) Tank supply channels flowing in government lands are clearly marked. However, when a channel flows in a *patta* land (private land) it may not be specified.	When a channel flows through a *patta* land (private land) only easements are available for other *pattadar*s to use it, or to do repair in it. In case, if the *pattadar* sells his piece of land (channel); or desires to put the land for uses other than a channel he may not be prevented as easily.
3	Field Measurement Book (FMB) sketches of 1:500	• Tanks are marked clearly and specifications known exactly • Major supply channels are marked with specifications	• Smaller supply channels are not marked • Many field channels are not marked. Conflicts arise when someone denies the existence of channels running in their piece of lands.

(Table 9.1 continued)

Sl. No.	Details [type of public record/document]	Shortcoming [contents of public record/document]	Remark [problems in establishing rights]
4	Adangal – prepared every year by the VAO	• Expected to record what is cultivated in every piece of land within a village • All encroachments in government lands including tanks and channels need to be recorded	• Not sincerely done • Encroachments of recent origins are not recorded

The village boundaries for all revenue villages were fixed before the end of nineteenth century and very few revenue villages have developed since. The maps and settlement reports were originally prepared at the time of the land settlements. Currently, the Revenue Department and its Directorate of Land Survey and Records (DLSR) print these records and update them. The updating includes changes made in survey numbers, and incorporating any physiographic changes therein. The revisions of the land records especially maps creates an arduous procedure for the Department. Every round of updating the village maps and FMB sketches invites a number of petitions from those who are affected, when the updates change the *status quo*. For example, the last round of the Update Register (UDR) Scheme in Tamil Nadu, including the update of the Field Measurement Books (FMB) and village registers completed between 1979 and 1987. This update is still generating huge numbers of petitions to authorities for a recheck of changes[9].

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[9] This observation is based on the discussions with VAOs in Madurai and Ramanathapuram districts during my field work in June- October 2010 and August-December 2011. VAOs told me the UDR scheme used mostly temporary

Any changes made in the maps often become one of the serious contentions resulting in litigation. Any change made in the map, benefitting a party often leads to litigation. The new claimants have huge incentives to defend the changes, while the existing users (those affected by the changes) want to preserve the *status quo*. For example, in the case of *K.A.Karuppiah Thevar v Raju Thevar* the litigation went on for more than four decades with three original suits and five appeals and several interim petitions. All the cases used in this study show the decisive nature of the documents in deciding the claims made in the courts.

It has to be remembered that the tanks existed long before the British system of documenting them through maps. The land revenue system issued various documents in support of establishing different property rights and tenurial rights not only to individuals but also for the government. The property rights thus established is not consistent with the pre-existing systems of administering the tank systems and led to many conflicts. The revenue documents are an important element in resolving any conflict. The cases discussed in this chapter here invariably show all these records are problematic.

The following two cases described below demonstrate a contrasting situation about the public records, such as maps and village registers, affecting the tanks and channels. In the *K.A.Karuppiah Thevar v Raju Thevar* **(**discussed below), a newly created map determined the existence of a channel, a major claim that might destabilize the upper tank. Contrarily, in the *Theyvanaiammal v Chappani case* the court finds just the opposite. The court arrived at two different decisions but did so without venturing into assessing the technological aspects involved.

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staff who were on contractual terms did too many changes for extraneous considerations which lead to thousands of revisions and hundreds of litigations. Typical mistakes are about recording the margins of supply channels adjoining the private lands as their own land.

Case-1*: K.A.Karuppiah Thevar v Raju Thevar*[10]

In 1968, in a tank named Nelmudikkarai in Thiruppuvanam town of Sivagangai district, a part of a channel leading from sluice no.4 (named as *Kaliyandhur channel)* was obliterated (destroyed) by Raju Thevar and his fellow villagers. A suit was filed by farmers from the lower tank (named Irukkumadi) in 1969 to restore the channel. The tank has 2400 acres of *ayacut* and its fourth sluice alone irrigates around 1500 acres in three different villages. The reason for the destruction according to the upper tank farmers was that such a channel did not exist in the village records, and hence the existence on the ground cannot be allowed. According to the petitioners Karuppiah Thevar and others, the obliteration meant that their tank did not receive its usual supply of water from the said sluice. Their tank had an irrigated area of 133 acres. According to them, even though the records are absent about it, the channel was a regular arrangement and existed for a long time, may be for centuries[11].

Both tanks are located in the lower Vaigai basin in Sivagangai district, and they served different but adjoining villages. The source of water for both tanks is from the river Vaigai supplied through a channel leading to Nelmudikkarai. When it becomes full, the surpluses along with its field drainages[12] flow down to the Irukkumadi tank. The village records for Irukkumadi tank said the

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[10]*K.A.Karuppiah thevar and others V Raju and others***,** Ordinary Suit No. 408/1969. In the Court of the Principal District Munsif, Manamadurai, Ramanathapuram district.

[11] Water deliveries from the upper tank through a sluice is not very common but rare. Refer to chapter 8 on KAS where an upper tank supplies water through a dedicated sluice to a lower tank.

[12] Drainages from paddy fields is considerable in the early part of the season. As the crop matures there may be less and less drainage. During water shortages there may not be any at all. Some *ayacut*s have drainage channels that can effectively drain and conduct water to the tank below. In some tanks these drainage channels have some privileges and considered to be part of an extended *ayacut* and assessed at a higher rate for land revenue.

source for it is from the upper tank but makes no mention of the water from sluice no.4 of the upper tank.

In the late 1960s, due to hydraulic changes undertaken in River Vaigai[13], many supply channels taking off from the river received less than their usual supplies. The obliteration of *Kaliyandhur* channel occurred in the same period. The main arguments of the upper tank *ayacutdars* were that (i) if such a channel is provided as 'a matter of right' leading from one of their sluices, it may result in compelling them to give water to the lower tank as long as it requires; (ii) the *mamul* (regular) right as claimed by the lower tank is only a conditional right enjoyable only after satisfying the superior claimants (the upper tank); (iii) since the upper tank itself is facing problems of reduction from river Vaigai[14] the lower ones cannot force them to release water stored in the upper tank as they pleased.

The lower tank farmers stated that the channel is not found in the map and settlement register because of a mistake by the revenue authorities. They said, in reality they are using the sluice and channel for time immemorial. They had no revenue records such as the Field Measurement Books (FMB) or Village Maps as evidence. However, for unknown reasons, the sluice no.4 in the upper tank was named after the village – Kaliyandhur where the lower tank is located. This was cited as evidence by them. While the suit was still being heard in the District Court, in April 1970, the Revenue Department at the request of the lower village revised the map and included the existence of a channel. Based on the revised maps the Munsif Court ruled the channel

[13] Refer to chapter 7 on Vaigai especially the reduction of flows in lower Vaigai after the alterations in Peranai, construction of Vaigai reservoir and the modernisation projects establishing head sluices on the river. All these together has reduced supplies from the river into channels.

[14] The general reduction of water in Vaigai is discussed in chapter 7. The main reasons for reduction of flows in the river is due to appropriation of water by Periyar areas, and the hydraulic changes done in the river that destabilised the traditional lower Vaigai channels.

must exist and hence needed to be restored. The court did not venture further into any other technical necessities of having or not having such a channel or availability of water or about the nature of rights - superior versus inferior.

The appeals

The upper tank farmers went on first appeal[15] to the District Court that has reconfirmed the findings of the Munsif court. On a second appeal[16] to the Madras High Court, they wanted 'a court appointed commission' to re-assess the tank and to retry the case from the beginning. The High Court, agreeing with the plea, remanded the case once again to the Munsif court which dealt with the original suit in 1969. The court arrived at the same decision as it had done previously and passed the same order allowing the channel to exist. This decision restored the channel and the prescriptive right for the lower tank users. However, despite the ruling of the court, the channel could not be excavated by the lower tank villagers because of stiff resistance from the upper village. So, the conflict was not resolved.

In 2006, the upper tank farmers once again went to the High Court and argued that the lower court decided the issue simply based on a small revision done in the land revenue records. They contended that the changes made on the map by the surveyor was not in accordance with settled procedure[17] and wanted it to be annulled. Though the High Court did not agree with this

[15] Appeal Suit no. 83/1973, In the Sub Court of Sivagangai

[16] Second Appeal no.626/1975, In the High Court of Madras

[17] Settled procedure in surveying a disputed piece of land is that all the neighbours must be present when the surveyor makes his measurements. If the measurement is contested by any party they may seek District Surveyor to redo the exercise. Even after this, any party is dissatisfied about the measurements it is for the Collector to judge the proceedings and pass a final order and an approval of the map.

argument, it wanted the District Collector[18] to consider the issue raised by the appellants (the upper tank farmers) to find whether the records are changed according to procedure or not. Once the Collector makes a decision either way, the parties may go back to the lower court on the same issue to seek any remedy if they are not satisfied with his orders. The High Court also ordered the government should be made a party in the suit, and should state its position with respect to the claims and counter claims made by the petitioners and defendants. Until that time the obliterated channel should not be rehabilitated and parties should maintain the *status quo*.

In 2008, the Collector, after departmental enquiries, concluded that the records were changed as per procedure and hence the channel must exist. The upper tank *ayacutdars* were not pleased with this order and in 2008, a fresh suit[19] was filed again in the sub-court. Only at this instant, the PWD and the Revenue Department took an official position about the channel.

In 2011, the case was still under trial and yet to be concluded.

Role of government

In situations involving a conflict like this between two tanks, the position of the government becomes highly unpredictable. Nearly four decades passed since the filing of the suit in this case. Neither was the government bothered nor did the court seek its position as the owner of the tank. The government simply watched and did nothing to find a resolution within the means available to them. As soon as the court wanted to know, the government supported the lower tank. The position taken by the government was purely based on three reasons. They are:

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[18] Under the land revenue laws dealing with the documentations the District collector is the controlling authority for the land survey, and the land Revenue Department.

[19] O.S.no. 79/2008, In District Munsif court, Manamadurai.

(i) The contested channel is included in the land revenue map, and hence it must exist[20]. As we know, the incident happened in 1968, the litigation commenced in 1969 and the channel got included in the map only in 1970.

(ii) The government said it has got sovereign and paramount rights over all waters in the territory and can allocate as it decides. In this case, it desires the waters of the upper tank be shared with the lower tank.

(iii) The suit should not be admitted for trial in District Courts because the *Madras Tank Improvement Act 1949*[21] confers all powers to it to deal with tank improvements[22]. Civil courts have no powers to intervene in such projects. Improvements include bringing water from any other tank.

Since the government used its sovereign powers drawn from these statutes and case laws that are not necessarily relevant to the case in hand, the balance has totally tilted to the new claimants. Ideally the government should have assessed the availability of enough water to ensure for the lower tank before they exercise their paramount powers and the powers under the *Tank Improvement Act 1949*. Without assessing this, it is not known clearly what were the technical reasons on which the government's decision is founded. As it appears the case may not end in any near future and may go on.

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[20] The map was revised long after the suit was filed and taken for trial in the court.

[21] *s3* and *s4* of the *Tamil Nadu Minor Irrigation Tanks and Improvement Act 1949* gives powers to the government to change any specification of a tank. In a case, involving some existing tanks and a newly built dam the Madras High Court ruled the lower courts shall not hear a civil suit when the government uses this law to do any change that may affect the existing users.

[22] In *Collector, Tirunelveli v Sudalaipothi Nadar [1998] (3) MLJ 481*, the High Court has ruled 'no suits be heard in District Courts under this Act'.

Case-2: *Theyvanai Ammal v Chappani*[23]*,*

Theyvanai Ammal, the plaintiff claimed a part of her conditional *patta* land was unilaterally changed and marked as a piece of government land meant for a channel feeding a tank. Previously, this particular piece of land was a *ryoti* land[24] where occupiers have certain rights to cultivate them. She claimed the Village Administrative Officer (VAO) made the change in the village registers and the Field Measurement Book (FMB) without having any legal basis. She was aggrieved that her family had conditional *patta* for a long time in the said land and wanted the court to quash these changes. Also she sought a compensation of Rs 10,000 for causing mental hardships for making such a change in village records. The lands held by Theyvanai Ammal were given in possession to her family during the first *ryotwari* settlement in Ramanathapuram district in 1956. Until then Ramanathapuram district was a *zamindari* estate. In 1996, the title was confirmed in her name and she could claim as a *pattadar* without any conditions attached. A new VAO took charge in 2002 and made changes in the village records that showed the piece of land as a channel. It is not known from the documents that why the VAO made such a change. But it is not uncommon for villagers to make petitions against *pattadars* who have held lands belonging to supply channels of tanks. Aggrieved by the changes made by the VAO, she filed the suit claiming the records were not updated properly.

The District Court agreed with her contentions and ruled in her favour by striking down the changes made by the VAO in the village records. The VAO was also asked to pay compensation of Rs 2,500 for causing mental hardships through his act of 'wrongly marking' it as a channel in the records. The court

[23]O.S.No. 51/2002, In Additional district civil and judicial court, Manamadurai

[24] Discussions related to *ryoti* lands in *zamindari* tracts and the many definitions of what is a tank and not is discussed in the chapter-6.

did not find out whether there existed a channel or not[25], or to accept the reasons given by the VAO for making such a change, or to call for the PWD or the Panchayat responsible for maintaining tanks about this. It only considered the property documents in hand and arrived at such a decision to conclude it as a private property.

We need to recall the discussions in section 6.2 on Defining a tank in the context of Occupancy rights where the Courts defined and redefined what is a tank and not while safeguarding the occupancy rights of the encroachers in the *zamindaris*. This case in the erstwhile *zamindari* of Sivaganga show the Courts still follow the same methods and means without ever looking at the needs of the tank to survive. This case is again about upholding the sanctity of the property records - both individual and the government properties. It again shows that the tank is not viewed as a technology system, and whether the laws governing it have any concern for its integrity and existence.

9.4 TANK AS A PIECE OF LAND

As we have seen in the above two cases, the courts treat the issue as a matter of ensuring the property right rather than solving any technical problem that arose out of giving or taking away such property rights. The prime concern for the litigants is to prove the existence of their property rights with the use of documents, and in some cases with oral testimony and/or other circumstantial evidence. The technical issues of water storage, capacity of channels, direction of channels, drainage lines are seldom given any importance in the proceedings. Added to this, there are other uses of channels[26]. Many field channels within the

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[25] Civil courts are not expected to normally find any remedy other than what is being asked for. However, in many cases the plaintiffs do seek any remedy it considers fit and hence, the Court may pronounce its views and any other possible remedies.

[26] The channels are used for many purposes apart from conveying water. Normally supply channels of many tanks are used as local pathways between adjoining villages. Field channels are used as pathways to traverse through the *ayacut*.

ayacut act as pathways for the farmers to walk up and down from the sluices. Some field channels are wide enough to act as cart tracks on their bunds. Tank *ayacuts* usually become marshy when the puddling for rice plantation starts. At this juncture, the field channels and their banks are used by farmers to reach their plots and oversee their turn of diverting water into their fields. The field channels are not fully marked as government lands but held as *patta* lands. Normally, the users of the channel have easement rights to convey water and move up and down. If some channels are converted for some reasons into housing and for other uses, few options are left for the *ayacutdars* other than seeking the court actions to remove them. The following case shows the conflicts arising due to conversion of channels.

Case- 3 *U.Krishnan v V.Sakthivel Pillai and District Collector*[27]

> In 2002, the plaintiffs, Krishnan and a group of over 100 farmers in Manamadurai tank, went to District Court to restore a dismantled channel that was also used as a pathway by them collectively. They alleged that a wall of 500 feet long constructed by the defendants had constricted the field channel. The plaintiffs claimed their customary easements over the channel for conveying water and traversing on its banks with bullock carts and tractors was not respected, but violated by the defendants. The defendants were rich farmers and businessmen in the same town with substantial lands in the *ayacut*. They built some buildings in it, and sold a part of their lands. They replied in court that they did not affect any easement rights held by the petitioners and showed their buildings are well within their *patta* lands as shown in their property documents. The plaintiffs had included the government as a defendant and hence forced it to take a stand. There was no documentary[28] evidence with anyone

[27] O.S.no. 81/2002, In the Additional district civil and judicial court, Manamadurai.

[28] Not all the channels are government property. In case, if someone has to show the existence of a particular channel it must exist in the village map, A- register, and the FMB. Otherwise, the claim of existence should be proved in a court using

including the Revenue Department. The available records did not show the channel in the same dimensions as claimed by the plaintiffs. Also the pathway was not marked in the maps in the particular place as claimed by the plaintiffs. The Collector was asked what was available in the land revenue records but his response did not comment on the constriction of the said channel by the defendants.

The Court had framed the issues as (i) who has the ownership of the said channel; (ii) the claims of the petitioners about their easement rights to traverse up and down. The village map with a scale of 1:5000, and the Field Measurement Book (FMB) sketches with a scale of 1:500 were the documentary evidences produced in court. The village map had just an arrow mark[29] indicating water flows down through the said survey number. The FMB did not carry any specification of the channel. The A-Register of the Village did not specify the piece as a government land but as *patta* land held by the defendants. However, the witnesses, who were also cultivators in the same tank, have said they always walked down that piece of channel to reach the road and tank bund. The court appointed commissioner reported seeing no pathway but only a compound wall that is newly built by the defendants.

The Court concluded that the channel alone runs in the defendant's lands. Since the defendants had allocated a strip of six feet width for the

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any other evidences. It could be anything: oral evidences, directions of water flow in the map, channels for the adjoining fields and survey numbers, tank memoirs or any government reports etc.,

[29] A legend in the village maps of an arrow is to indicate the water flows in that direction. Only when the FMB shows the piece of land as a channel it will be accepted as a channel. Or else the interpretation is that the water drains down in some portion of the survey number on the marked direction. At times a single survey number in a map may cover vast areas may be as big as 100 ha and it becomes extremely difficult to establish the size and exact location of the channel.

channel, water can still flow through but the flow may be less than the past. Since there was no mention about the existence of any pathway the claim made by petitioners was dismissed and no relief was given to them.

The court took nearly three years to arrive at this decision and the plaintiffs told me that they may appeal again as the stakes involved are very high. A land without a pathway fetches poor value in this fast changing town. This case again revolved around the land revenue records. The court did not go into verifying the adequacy of the size of the present channel to carry enough water and the need for a pathway within the *ayacut*. Rather it limited itself to find the ownership of the piece of land and nothing more.

Typically the issues in this type of litigations is solely due to the treatment given to channels in revenue records. Since there is no exact measurements available for most of the channels it is difficult to establish in court the original width. The land owners (where the channels run) may leave the very minimum width without having concern for the capacity of the channel and whether others below this point experience difficulties, resulting in frequent quarrels. Tanks existed long before the land settlements that produced the property documents and led to this problematic situation. In the absence of exact specifications of channels the farmers are left with easement rights to use others' property to fulfil their requirements of walking down and carrying water.

The *Indian Easements Act 1882* recognises customs and customary practices and rights held collectively as a group or as a village. Most of the cases of this nature are fought using this law wherein the plaintiffs always claim they had a custom or customary practice. In every such occasion, it becomes incumbent upon the claimant to prove in court the existence of such a custom. Since many of these customs and practices are not fully codified, the situation becomes complex and requires lengthy litigation to establish it. Even when it is established, the courts rarely go behind the technical reasons for such customs, which would help to understand the reasoning and to conclude it right or wrong, as in the above case.

In essence, the courts view the tanks as a piece of land property held by parties leaving no scope to preserve the integrity of tank, and its channels.

9.5 INCOMPLETE TECHNICAL DOCUMENTATION

The following case *Shanmugavel v District collector* shows that incomplete technical documentations about tank structures in revenue documents and absence of Tank memoirs bringing perpetual conflicts among the tank users with a tank.

Case -4 *Shanmugavel V District collector*[30]*, Virudhunagar*

This case is about a head reach irrigator becoming tail ender because of changes made in the tank while it was standardized. The case was argued in the District Court. The plaintiffs (Shanmugavel and others) from N.Mukkulam tank claimed they had a pipe to deliver water from the tank, and a channel conveyed the water from the pipe to their part of *ayacut.* The pipe was forcefully dismantled by the government. The plaintiffs alleged it was removed on behalf of some local powerful people and wanted to restore the arrangement. The issue arose after the completion of a Tank standardization project[31] completed in the 1970s. The standardized tank had three masonry sluices to irrigate all lands under the tank. The plaintiffs claimed the changes did not benefit them, rather it disadvantaged them.

The plaintiffs had their lands at one flank of the tank and were comfortable with the pipe arrangement. But after the change they became tail enders of the newly installed sluice. They did not agree with this arrangement and wanted either a separate sluice in place of the pipe

[30] O.S.No. 37/2003, In the District Munsif Court, Aruppukottai.

[31] Prior to 1970s, many sluices were simple pipes or open cuts on the tank bund. For lands on the flanks, these kinds of pipe sluices and open cuts are common and advantageous but a risk to the tank stability. Hence many such pipes were closed down and offered alternative channels from the newly built sluices.

or left as it was. Since they were not provided with a sluice, they continued to use the pipe as before. This was objected by others who thought they received an undue advantage of having two sources of water from the old pipe as well as the newly built sluice.

After some quarrels, the *Thasildar* visited the spot and informed them that there is no such pipe mentioned in the revenue records and hence the pipe be dismantled. The plaintiffs did not agree with this order and went to the District Court. In court the government denied the existence of such a pipe in their revenue records. The court did not go into technical arguments made by the plaintiffs that they being head enders before standardization became tail enders after the project. The court concluded the plaintiffs cannot be given the previous arrangement because there is no record of their claim.

Even though the plaintiffs asked for 'any other alternative arrangement' as one of their relief the judgement shows no discussion in court about arguing such a possibility. Technically the relief could be provided if a new sluice is built at the same spot where the old pipe was said to have existed but was not considered simply because the government denied such an existence in their records. This case again showed the problem of not having systematic records.

9.6 TANK USUFRUCT AS A PROPERTY RIGHT

Generating revenue from the tank usufructs was an area in which the colonial government tried many methods, such as giving *patta* over the trees and fishery. After the transfer of power, the government using the powers given under *s83* of the *Madras Panchayats Act 1958*, transferred the revenues from trees to the Panchayat Unions. The process of these transfers was completed in 1962 in Madurai district. During these transfers all previous usufructuary rights over the trees, and fishery were summarily cancelled. The case below is an effort of over one hundred *ayacutdars* to defend their right over trees and fishery in 1977.

Case- 5: ***U.S.Ramadoss V District collector Madurai; Panchayat Union, T.Kalluppatti; and Vaiyur Panchayat***[32]

Vaiyur Karisalkulam tank has a tank bed area of 63.20 ha and a bund of five km in length. The bed and the bund are ideal places to grow trees of Acacia species (*kattukaruvel*) yielding quality timber for ploughs, carts and firewood. The government through an order issued under the Panchayat Act transferred all the revenues from trees, fishery, silt and others to Vaiyur Panchayat in 1977[33]. The plaintiffs (Ramadoss and others) numbering over 100 farmers claimed that during the colonial times, a leading *Pattadar* of the village was given *SaswathaKattuKuthagai* (loosely means permanent irrevocable lease) for *Acacia* trees and fishery by the Collector[34].

Descendants and transferees of the said *pattadar* continued to enjoy the same and paid all applicable taxes regularly until this takeover. Though it was not known exactly how long they had enjoyed, the earliest proof they could produce in court was a *patta* that was renewed in the year 1877. Since it is a 'renewal', they claimed they must have been enjoying it even before. Hence, their right cannot be taken away at this time through such summary transfers.

In the court they had also produced documents to show similar efforts to take away their rights by the British government at various times. They successfully fought back at that time and had some documents in that regard. They could produce documents issued by the Collectors in 1906 and 1928, and by settlement officers in 1913 to that effect.

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[32]O.S.No. 549.1977, In the court of the Sub-judge of Madurai

[33] G.O.Ms. no. 2526 dated 19-11-1962 by the rural Development and Local Administration Department (RDLA)

[34] In chapter 5, I have discussed about the BSOs that allowed issue of *pattas* for trees alone.

However, the government interpreted the *patta* as a licence and not as a permanent grant. Since licenses cannot be inherited, the government can take it away now and also argued the right as a 'mere lease' and not an 'irrevocable lease'. The court did not accept any of these arguments and concluded the *patta* (held by the plaintiffs) was *more* than an enduring lease and shall be construed as a grant.

Also the court agreed, whatever be the nature of the property right, that since it preceded the *Transfer of Property Act 1882* it should be considered as a grant with some conditions. Since, the farmers have honoured all these conditions of paying regular taxes it cannot be undone by bringing a simple executive order. Also, the government cannot undo the original arrangement by its claim that the lease is said to be permanent and irrevocable by mere assumptions without having any original documents showing the tank and its revenues belong to it.

So the order of the government taking away the tree and fishery revenues were stayed.

The case again revealed the decisive nature of property rights that came after the land settlements in determining the enjoyment of trees and other usufructs from a common resource like the tanks. The documentation held by the *pattadars* for over one hundred years was found to help them to safeguard their right. *s 2(c)* of the *Transfer of Property Act 1882* retrospectively protected "any right or liability arising out of a legal relation constituted before this Act comes into force". Hence, the court interpreted the document held by the *pattadar*s to refer to a property that cannot be simply taken away by any simple declaration. The case once again depicts the nature and endurance of the regime of property rights established in tanks since the colonial rule. There are a few other similar cases reported upholding property rights in tree and fishery *patta* elsewhere[35].

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[35] There seems to be no precedent or any case reported to cancel the transfer of usufructuary rights done under the *Madras Panchayats Act 1958*. In

The case also threw up the other issue of who is the appropriate authority to take and use the revenues from tanks. The assumptions of the Government behind the transfer of revenue to Panchayats were based on the belief that Panchayats were legitimate local bodies representing the interests of all people within a Panchayat and must get the common revenue. However, a Panchayat may have many hamlets and many tanks, some of the hamlets may not want to leave their long held rights over the usufructs that they could use for the betterment of the tank. The said tank belonged to Vaiyur Panchayat with five hamlets but residents of only two hamlets had lands under the tank and others lived in a different Panchayat. The Panchayat may not spend all the proceeds from the tank contrary to the wishes of the *pattadars*. Naturally, the right holders have reason not to part with the revenue accrued from their right to the Panchayat.

9.7 CONDITIONAL PROPERTY RIGHTS: DESTABILISING THE TANKS

The Revenue Board Standing Orders (BSO) have always allowed the cultivation of tank beds, channel beds and tank bunds subject to some conditions. The conditional land holders called *Neerpidi pattadars* cultivate the waterspread whenever possible without affecting the tank storages. This means that when the tank is empty, the entire tank bed is available for them; when it is partially full the margins are available; and when it is completely full nothing is available. In many situations tank bed cultivators might start the cultivation inside the tank bed hoping, the tank will get filled up and their crop will not get submerged. But the tank may get filled late and spoil the crops leading to severe losses.

To avoid this happening, the cultivators resort to cutting open the bund to either drain the water; or put a ring bund around their piece of land; or sometimes fill up their lands and raise the bed level beyond the Full Tank Level (FTL) of the tank.

AlagarIyengar v State of Tamil Nadu, [2002] 4 LW 498, the Madras High Court upheld fishery rights held by 12 *pattadar*s by stating the fishery revenue is used for a common good of running a school by the same *pattadar*s for over hundred years, and hence cannot be taken away by simple declaration under the Panchayats Act.

Over years of repeated filling up, these *Neerpidipatta* lands may go above the FTL. At that stage, they may get the lands for themselves without any condition. This phenomenon is a result of the land settlement policies that do not consider a tank as a piece of technology that could be easily destabilized by filling it up over the years. The following case *Ramasamy Naicker v Sangu Reddiyar* shows the tensions created by such conditional *patta*s. In this case, the defendants had got the *patta* with a condition that they cultivate the (tank bed) lands only when it is dry. It is not uncommon that such *pattadars* often violate the conditions by emptying the tank water or elevating their tanks or put a ring bed to avoid submergence.

Case – 6*: Ramasamy Naicker and others V Sangu Reddiyar and others* [36]

> Over 60 *ayacutdars* from a tank named Mohaneri in Virudhunagar district sued 20 other conditional *pattadars* in the tank bed. Both groups belonged to the same village. The suit was filed in 1931, when the defendants put up a ring bund and filled up some portion of the bed by transferring earth from another portion. Thereby, the defendants caused a reduction of water storage in the tank leading to water shortages in the *ayacut*. In court the plaintiffs argued the act of the defendants violated the conditions of *patta*. Hence the *ayacutdars* wanted the court to grant an injunction against such actions. The court appointed a commissioner to verify the claims. The commissioner made a contour map of the present level of tank bed and compared it with the levels given in the tank memoir. The map proved that the conditional *pattadar*s were indulging in filling up their piece of lands. The map also showed that the contested portions of the tank are actually in the middle of the tank bed and were getting elevated above the FTL of the tank. The court accepted the arguments of the plaintiffs and ruled that the defendants did not honour the conditions and hence the bund be dismantled.

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[36] A.S.no. 1937/1931, In the court of District Judge of Ramnad at Madura.

This case showed tensions arise due to such a practice of giving conditional rights to cultivate the tank beds. Till date such tensions are prevalent in many tanks between *ayacutdars* and foreshore cultivators. Such a practice of allowing cultivation would never have been allowed in the first place if tanks were considered important as sources of water. I believe many tanks over the years have lost the storages due to this phenomena of filling up the beds for conditional *pattadars*.

9.8 Promoting Irrigation Institutions: Conflicts between Laws

After the command area programmes commenced in India, several hundred irrigation associations were formed to promote participatory irrigation. Such associations in many places are registered under the *Tamil Nadu Societies Registration Act*[37] *1975*. This statute allows the incorporation of any type of membership associations involved in cultural, scientific or recreational purposes. Several government projects related to irrigation management and watershed development had formed associations of farmers using this law. Public funds are passed through such associations to undertake specific works such as watershed development or tank repairs etc., The *Tamil Nadu Farmers Management in Irrigation Systems (TNFMIS) Act 2005* was introduced to organize irrigation societies under the World Bank sponsored reforms in the water sector,. TNFMIS 2005 envisaged water management functions to the newly established societies. This Act defines the *ayacutdars* (land holders in the irrigation command), membership, functions, electoral college, and procedures for functioning of these societies. The PWD is given special powers to organize and oversee the associations formed under the TNFMIS. The following case discusses a tank conflict between two societies formed for similar purposes using two different laws.

[37] *Indian societies registration Act 1860* is one of the earliest statute allowed individuals to come together as associations during colonial times. Many literary, cultural and scientific associations, and political bodies came into existence using this law. *Tamil Nadu Societies Registration Act 1975* is an adaptation of this central Act for similar purposes.

Case- 7 ***Ganesan, President of Piramanur Channel irrigators Association V The District collector[38], Sivagangai***

The plaintiff association claimed it is a registered organization under the Societies Act and responsible for irrigation management of the said tank and the channel. It brought a suit against the government to stop elections in another association constituted under the *TNFMIS Act* for the same tank. The plaintiff association had functioned[39] for six years, and implemented some government sponsored development works using public funds. It argued that the new association formed under *TNFMIS Act* would reduce the existing association's credibility. It also said that the new association included members who were not from the village and unconnected to the tank.

The government replied in court that the new association is established by *TNFMIS Act 2005*, a special statute which defines the membership for the society. The elections for office bearers are based on the procedure prescribed by this Act. Therefore, the existing association cannot stop the new association coming into force. The court accepted the government's position and allowed the election to proceed. The court differentiated the previously formed and functioning association as a membership-based organization formed out of volition but the new one is mandated by TNFMIS Act to promote the management of irrigation.

Though on the surface, the case looks very trivial but the reasons behind them are very deep. There are hundreds of associations in many tanks that have functioned for a long time (some for half a century and more) and hold huge properties, cash reserves, and effectively support their *ayacutdars*. Now, they all have to face these new institutions that are introduced through the *TNFMIS Act 2005*. The old

[38] O.S.No.18/2004, In Additional District Munsif court Manamadurai

[39] There are many such societies functioning in Tamil Nadu, and some were even promoted by the same department in previous schemes.

associations fear their hold on the tanks is removed because the PWD has been given powers to oversee the association. Effectively, the PWD can disband these societies formed under TNFMIS if in their view they violate the procedures set in the law. The existing associations formed under Societies Act were not controlled by anyone other than by their own members and do not want this type of specialized societies made through a specific law and controlled by the government.

After this law was enacted, the dynamics of irrigation associations have changed in several places[40]. Several issues arise from this law, such as what happens to the status of old associations formed under the Societies Act. The experience of cooperative movements (in the past) in the state is replete with thousands of examples of the disbanding of genuine cooperative societies by the government. Under the *Cooperative Societies Act 1904*, there was a thriving cooperative movement in the state in finance, dairy, agriculture, textile and other crafts. Many such societies became amenable to bureaucratic and political control using provisions brought in this law that give powers to government to disband the executive committees of the societies. While the World Bank pushes for special laws to bring and empower such societies in irrigation functions, many argue it would become another source of bureaucratic and political control of voluntary irrigation associations governed by a general law, where limited scope exists for the external interventions. The case discussed above shows the conflict arises between two societies promoted in a tank for the same purpose under two different laws.

9.9 ABUSE OF TANKS AND INABILITIES OF COURTS TO PREVENT

Conflicts between the government agencies and the villagers in maintaining small water bodies are an everyday issue. Hundreds of news items report on the abuse

[40] Personal observations from the visits made to Pooseri, Vallakulam and Tehriruveli tanks in Mudhukulathur Taluk in 27-30 October 2011. The previously existing associations even though were functioning well could not continue against the new one formed under the TNFMIS Act.

of traditional ponds and tanks being converted for building all kinds of structures such as lavatories, bus stands and shops etc., by the government and its many agencies. Even the Panchayats and School Education Departments actively indulge in dismantling such tanks and ponds[41].

Case – 8 *Krishnammal V The Planning Coordinator, Sarvashiksa Abhiyan, Virudhunagar; and the District collector, Virudhunagar*[42]*.*

The plaintiffs brought the suit to prevent building a lavatory (and other related facilities) on a land marked as a village pond by the Panchayat and the School administration. The tank was lying barren because its supply channels had been choked and silted up for a long time. In parts of this tank, the Panchayat had built a school in 1996, a village stadium in 1998, and a lavatory complex in 2004. The plaintiffs claimed the water body is meant for public use and needed to be developed and protected. They alleged, contrary to the existing law and policy that the officials of the school administration and the Panchayat decided to dismantle it. This needed to be stopped.

They sought for an injunction, which the court did not give. Rather the court appointed a Commissioner to find out what was going on. The commissioner reported that the allegations of the plaintiffs were true. However, by the time the reports arrived and Court could make a decision the lavatory and other structures were completed and thus the case became infructuous[43].

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[41] Some of the Public Interest Litigations including *Sucheta v State of Tamil Nadu* aimed to stop the abuse of tanks is discussed in chapter 6.

[42] O.s.no. 362/2004 In the court of the District Civil Judge, Sivakasi.

[43] *Susetha V Union of India, [2010] CDJ MHC 4613*.Even though the court agreed such water bodies 'need to be protected' it ruled in favour of dismantling the water body.

The case shows the inability of lower courts to use its powers to make the Panchayats and the government desist from such practices. The advocate[44] I met to discuss this case in Sivakasi said that, as far as he knows, most *Ooranis* (small tanks/ponds) in the district located closer or in the middle of the habitations were already destroyed due to such unscrupulous actions that could not be prevented by anyone including the Courts.

9.10 How do villagers negotiate among themselves?

Tanks are dynamic systems facing many changes now and then. The users especially the farmers realize the situation and prepared to negotiate and settle among them whenever a facilitating situation exists. This case depicts a situation where a number of villages were in serious conflict and negotiated and arrived at new solutions that go beyond their limits.

Case -9 *P.Ramachandran and others V R.Ganesan and others*[45]

This dispute is between two villagers trying to get water from Vaigai river fought in the District Court in Manamadurai. In 2001, the farmers of Kattanur tank in Sivagangai district took an initiative to excavate a new supply channel that would cross two other tanks on its way belonging to the plaintiffs. The plaintiffs went to court seeking an injunction of such an act claiming the newly created channel would affect the inflows into their tank. No one had any document with them to show either it is right or wrong. The government departments such as the Irrigation and Revenue were not called into the case as a party or in any other capacity by any of the parties.

The issue of finding alternative channels arose due to the continuously reducing flows in river Vaigai, and thriving encroachments on the existing

[44]Mr.Ravichandran, Advocate with an office in Sivakasi town told me this information on 17 November 2011

[45]O.S.no. 113/2001, In Additional District Munsif court, Manamadurai

supply channels of the Kattanur tank. Without having a steady source, the farmers understood the recent changes in the catchments (such as formation of roads) created an opportunity to develop a new channel to Kattanur. However on its way it needed to cross these two tanks. They felt some of these waters belonging to their catchment might also be carried with the new channel. This was objected and the issue went to court.

While the case was being tried, the parties made an agreement among themselves after some mediation between the villagers. One of the conditions of the agreement is that it is the responsibility of the plaintiffs to convince the PWD to put a shutter arrangement in the existing diversion so that they both can take water in similar terms. Overall, the contesting villages were satisfied that their tanks will be served better than in the past by means of the new arrangements. By using a rule in the Indian civil procedure code (CPC) the court passed the same agreement as its verdict, without going into any of the legalities involved. It appears from the judgement that both the contesting villages were satisfied with such an agreement.

9.11 Conclusion

The micro level cases discussed here show some of the repeated issues of property right, records, and the technology of tanks. They include the state and its hierarchy of administration that did not understand the technology in its full capacity. As a legacy today, the Revenue Department holds the key for all state actions with the Collector as Chief of the District controlling other professional and administrative agencies. The Collector’s decision is supreme and the many departments such as Irrigation, forest and fishery with varying responsibilities towards the tanks rely and revolve around this institution.

The deeper causal issues around state actions are detrimental to the performance and existence of tanks. In all the cases discussed the dispute arose simply because either there is inadequate or poor documentation, or interventions of agencies without respecting the existing practice. The property rights issue is at the core of all conflicts and holds the key to resolving conflicts. Defining of communal properties such as tanks and channels are poorly done from the beginning of land settlements. There are systemic problems with the creation of records, updating them and keeping them. The very many conflicts arise simply due to the fact that the records do not reflect the reality on the ground. The Courts rely mostly on the records and decisions are directly affected by the availability and quality of records. The recognition of tanks as fluid and dynamic systems that need to be looked carefully with room given for the local people to negotiate and manage the issues is totally non-existent. If there are negotiations happening in some places it is just due to the initiatives of the locals and not by any governmental efforts.

The conflicts discussed here demonstrate the simplistic view taken by the courts. Though the Courts are expected to view the conflicts through the universal rational principles of statute law they fail to do so. The science part of these so-called universal principles is either ignored or subjected to the pushes and pulls of the private property claims. As we have seen, the courts did not need to know - whether sufficient water is available in the upper tank before ordering to issue a prescriptive right to a lower tank (*Karuppiah Thevar v Raja*); or the constricted channels are good enough to carry the flow of water (*U.Krishnan v V.Sakthivel Pillai*); or why a farmer in the head reach should become a tail ender farmer just because there is no data *(Shanmugavel v district collector, Virudhunagar).*

With respect to land settlements, law and the courts Ramsay Macdonald observed, “We came to the village. We did not understand its spiritual or its economic basis... We surveyed lands and laid down definite boundaries; we created individual landlords; we established regular courts, which applied to India the property laws of the West (MacDonald 1910, 220)”. The principles of property, revenue, and law constituted the present structure of the government administering tanks. Certainly these do not go hand in hand to bring a good performance in tanks as we saw in LVR, Palani and the micro level cases discussed here.

10. CONCLUSION

10.1 INTRODUCTION

The central research question for the study was to evaluate the effects of casting traditional technologies such as tank systems into modern legal frameworks; and to find out whether traditional technologies operating within modern constitutional contexts provide answers to conflict between water users. This research has looked at the role of traditional, national and local laws that define and deal with tanks. Tanks are viewed as technology systems and hence the relationship between law and technology, namely how much the law understands this technology is studied using case studies and court cases. The study inquired into the relationship between the law and technology. The research questions for this thesis were: i) how do disciplinary understandings of tanks limit our knowledge of systemic and dynamic nature of tanks? ii) what kind of empirical foundations are needed to re-theorise tanks in a holistic and multidisciplinary way? iii) how does incorporating tank conflicts help us widen our understanding of tanks as dynamic systems? iv) how does a socio-legal and contextual understanding of tank conflicts change the way we problematise tanks and conflicts related to them? Related to these wider questions this thesis addressed a set of new empirical issues namely: What are the tank conflicts; why do they arise?; what are the laws deal with tanks and conflicts?; how and why did the laws come into effect?; what rights do various actors (state, its institutions and agents, community, individuals and others) have?; what are the consequences of modern technology interventions in tanks?

The original contribution to knowledge

This study is first of its kind

(i) To comprehensively investigate the role of law and technology in understanding conflicts in traditional water systems using empirical investigations. To the best of my knowledge, so far, this research is the first one to undertake such a socio-legal and contextual analysis of law and technology in traditional water systems. My empirical investigations set up the premise for new directions in theorising tanks in the future, a project that I hope to pursue.

(ii) To investigate the main body of water law- the Board Standing Orders which is largely ignored in legal research. Implicit in the water law literature is a conception of statute law. My work shows that in relation to tanks this is not the case and that much of the law continues to be administrative instructions developed over several centuries. The chapter on Board Standing Orders and the governance regimes they create for tanks opens up the pathway for new ways of theorising tank systems and for socio-legal analysis of tank systems in the future.

(iii) To prepare detailed case studies of conflicts occurring in tank systems at different levels indicating the complexities of traditional systems. The analysis of cases at macro, meso and micro levels lays the premise for ways in which the law may be incorporated into our understanding of tanks as dynamic systems.

(iv) To investigate *intra-state* water conflicts occurring in smaller river basins within Indian states. This area of study is largely overshadowed in the mainstream research on the study of *inter-state* water conflicts.

Taken together, by undertaking this investigation I have been able to set up the premise for a comprehensive research programme that opens up pathways for theoretical innovation in the future.

10.2 The Legal framework

The present legal framework that governs the tanks includes land settlement laws and the Board Standing Orders (BSOs) and a body of case law as discussed in chapter 4, 5 and 6. They have created a regime of rights, agencies, and dispute resolution mechanisms. The regime of rights includes: property rights for the government to own the tank beds and some parts of channels; user rights for the *ayacutdars* to irrigate with the tank water; and different types of usufructuary rights to use bunds for planting trees, channels and tank beds to obtain fishery, excavate sand and silt, etc. The government as property owner of tanks (represented by the Land Revenue Department) has given responsibilities to the WRO-PWD to maintain and manage large tanks. In the same way, the Panchayats are given rights to maintain and manage tanks and also to generate revenue from many usufructs in small tanks. Dispute resolution is solely through the courts.

I have elaborated in chapters 2 to 4 that tanks existed long before present laws and inventories of its engineering were introduced. It is true that the BSOs did take some of the pre-colonial situation into account but also discarded much of it in favour of an imported legal system. This has been done to satisfy the compulsions for revenue collections by the British rulers. Though revenue is an unimportant factor after the transfer of powers, the same laws continue. When it comes to water law, this study finds whatever was done during the British rule remains the same with very limited changes until now. Presently, the whole of Tamil Nadu is under the *ryotwari* system of land and water administration that follows the same BSOs is a creation of the land revenue bureaucracy without statutory basis –as administrative policy - to back it up. Further, this body of law continues to grow with the same foundations and in the same directions even after the transfer of power, resulting in the same or very similar conflicts as noticed in the colonial past. The absence of statutory basis and administrative orders for tank governance has ramifications for democratic governance.

Historians studying the macro-level 'historical processes' of formation of India under the colonial rule want us to believe that "the colonial power was mediated through a continuous process of negotiations with pre-colonial structures and notions of governance, authority and normative codes (Alavi 2002, 41)". Similar arguments of the 'processes of negotiations with pre-colonial structures' are advanced in anthropological studies specific to Tamil Nadu and tankfed areas (Mosse 1997; 2003; 2006) as well. However, specific to the water law of Tamil Nadu (former Madras Presidency), this study questions arguments about negotiations; rather it finds the contrary.

It is true that to some extent customs, *ryotwari* principles of land taxation were based on the pre-colonial principles. However, this was done with an opportunistic goal of making more revenue rather than following the past in any sincere manner. Discussions in chapters 4 to 8 show that there is a definite discontinuity from the past. The government emerges as a monopoly owner of all surface water systems and indiscriminately attempts to increase new irrigation areas resulting in destabilising many tank networks, making many divisions without much technical basis. This study thus finds a definite break from the pre-colonial past when the BSOs are considered together in the context of the conflicts witnessed in tanks. This break is made evident using the BSOs and the courts rather than the statute laws.

10.3 DECENTRALISATION AND TANKS

In the study of State of Tamil Nadu, the centralization of authority over land and water was achieved during the nineteenth century. I have discussed in chapter 5 about the overwhelming reason for centralization of tank administration was to generate increased land revenue. The political and economic situation had changed in the post colonial India wherein land revenue has become an insignificant proportion of total government revenues and hence is not a major concern. The debates surrounding decentralisation aim to alleviate the decline of tank performances such as decreasing irrigated areas and damages to tanks by way of encroachments.

The legal basis in administering and governing tanks remains more or less intact as they were during colonial times. This study has attempted to answer why decentralisation efforts without changing the land laws continuously fail. As far as tank administration is concerned the provisions related to tanks in the Panchayat Acts have not changed since 1920. There are 29 items presently allocated to Panchayats under the *Tamil Nadu Panchayats Act 1994*. This includes Minor Irrigation (including the Tanks) and Land development. How to actualize these items through the Panchayats is left open.

As discussed in chapter 5, the legal frameworks on land and water resources are antithetical to decentralisation. Only maintenance, management and other residual powers to collect usufructs from tanks were given to Panchayats. What is fundamentally required is not only the transfer of legal powers (over land and water resources) to Panchayats, but also the powers to legislate for the purpose of tank administration and management with necessary finances and powers. Only such a change may compel the State Governments to yield power for local self-governance and free tanks from revenue officials. Until then, the Panchayats may remain as ineffective as it were in the days of Lord Ripon notwithstanding the continuous efforts made in this regard. Such changes leading to real decentralisation call for fundamental changes in structure of India's federal constitution. Short of overhauling the constitutional framework 'decentralisation talk' is likely to remain just that – 'talk'.

The user associations that came up in the colonial times as well through many of the tank development and watershed development projects in the last three decades show the same lacuna as we observe with the Panchayats. These associations are considered as a mere collective of individual farmers who may not go beyond educating their members to act in a particular manner to improve the existing situation. Whenever they face conflicts (with their own members and government functionaries) they are at the mercy of land laws that give powers to land revenue authorities. The Water Management Acts like *Tamil Nadu Farmers Management in Irrigation Systems (TNFMIS) Act 2005* came at the behest of World Bank projects and face the same or similar issues. These Associations lack real powers to deal with conflicts, and limit themselves to developing the physical infrastructures of their tanks.

10.4 POSITIVE LAW AND THE TANK DISPUTES

This study has demonstrated that the rationale and concern for keeping tank's technological integrity takes a back seat in the courts which operate on principles of positive law. In the Madras presidency areas, positive laws come in many different forms. This includes the enactments made by the government at central and provincial levels, judicial orders, executive decrees, and many administrative regulations. They determine the outcome of any adjudication related to tanks. These laws are *a*historic. They do not recognise the community, which is at the heart of tank system. The context-free principles in positive law by their very nature abstract law from the communities within which they must operate. Tank systems traditionally functioned on customary practices that are just the opposite of positive laws in that they are context-specific, community based and decentralised in social practices and governance. This is in contrast to the discourses about decentralisation which are underpinned by a highly centralised, state-centred positive law. The revenue records such as settlement registers, field measurement book sketches and other maps introduced as part of land settlements forms part of positive law instruments used as evidence in litigation. These documents are the ones still used with limited updates of property owners. The colonial government enforced such a legal system based on the positivist law that continues till date (Pahuja 2007; Miller and Zumbansen 2011).

I have shown in chapter 5 and 6 that the various records created by the bureaucracy were either incomplete or bereft of the nuances. In the many other court cases discussed in chapter 7 to 9, the judges have made their decisions based mostly on texts provided to them in the form of revenue records and water flow data. As an example, the cases related to many channels show that they did not have exact boundaries in survey maps, and ran through private lands. When cases keep coming to Courts the land holders sitting on the channels and tank beds claim the piece of land belonged to them thereby depriving its use for the tank. The definitions given by court about what is and not a tank bed is an example of such a situation. The result is numerous conflicts related to encroachments and occupancy ryots to date discussed in this work.

In order to uphold the private property claims, courts did not appreciate the legal implications of lack of well defined records for common properties like the tanks, anicuts, channels and rivers. As we saw in *Robert Fischer v Secretary of State* the need for producing data becomes decisive in determining the judicial outcome of a conflict involving hundreds of tanks spread over a large geography like the

Lower Vaigai basin. The recording and generation of data related to water flows in the river was unknown in the pre-colonial order. Centuries of practice, custom, prior appropriation rights (that were again based on customary practices) became unacceptable and ignored by the court in deciding this bench mark case. In the end, the lack of positive evidence led to collapse of the case affecting the tank systems in a whole region.

It is not my case that customary practices are totally ignored. They are certainly accommodated in statutes relating to easements and other property laws, and the BSO. However, the discussions in chapter 6 and 9 show that they are subjected to several conditions and treated with contempt by courts. Hence, positive law with its textual emphasis and universal categories without context and substance is fundamentally incompatible with systems like the tanks.

10.5 Complexity of Tanks

Tanks as technology are complex and not local but span large areas. Planning for the development of tanks traditionally went beyond a single tank, or even a chain of tanks, to the entire basin or sometimes even beyond the basin. After colonial times, only a few hundred tanks have been built and there are no reports to indicate the development of a complete chain of tanks or a sub-basin as a whole. Therefore, this study concludes that it is not possible to claim that we know how tanks came into existence in a larger landscape- basin and beyond. However, underestimating the technological aspects of tanks has been a hallmark of the anthropological and historical studies. While contesting Witfogel's theory of hydraulic civilization Leach famously concluded,

> The Indian type of hydraulic society, of which Sinhala is an example, is cellular not centralised in structure; localised groups of technical specialists form a work team centred in a leader. The major hydraulic works are *not created rationally and systematically but haphazard as pieces of self advertisement by individual leaders*. But once started, such constructions survive and can be enhanced by later adventurers of the same type (emphasis added) (Leach 1959, 24).

Leach does not tell us how a technological system can survive simply because some chieftains and his workgroups have built tanks- all across. Tank engineering cannot be haphazard done guesswork. Even to do a modular development without affecting the other systems in and around, one must have a good understanding of the part *and* the whole.

This research, taking Vaigai basin as an example in Chapter-7 finds such notions repeated by many scholars need to be reassessed. Vaigai is very similar to the Sinhala example given by Leach[46]. However, the tanks in the Lower Vaigai region with geography of over 2000 sq.km were capable of draining a whole river all across the geography and above all had a dependability[47] of over 71 % until recent times. Such a high dependability in a huge area going beyond hundreds of villages demonstrates that they are more than 'haphazard' and an 'advertisement' of some charismatic leaders. However, the academic research[48] uncritically continues to treat them in the same way as Leach did without much basis.

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[46] In fact the largest of all ancient tanks in Sri Lanka has its name as Pandik kulam (Gunawardana 1971, 53). Pandiyas are the ancient rulers of Vaigai. Many types of water systems related to tanks have a prefix of Pandya and could be noticed in several parts of Tamil Nadu and Sri Lanka. Some of the commonly found names include Pandiyan Kayam (subsurface channel leading to a tank from a river), Pandiyan Kaal (channel feeding many tanks), Pandiyan kanmoi (tank), Pandiyan Oorani (drinking water pond), Pandiyan Madagu (Pandiyan sluice), Pandiyan Kalingu and so on.

[47] This dependability means every tank thus formed had excellent performance of getting filled in seven out of every ten years making the agriculture to thrive. Indeed many modern dams do not let alone match these essential criteria but nowhere nearer to giving such a sustained performance even for decades.

[48] To cite a few, the geographer Adiceam (1966) considers it to have been developed on 'a trial and error basis' (as cited and also supported by Mosse (2003, 31)). Lately, some scholars even reported that the technical requirements for forming a tank was "primarily a function of political will to invest in that locality and the topographical features of the site played a secondary role (Shah 2003, 38)".

Further, the many disputes that are discussed in this research show that the common understanding of tanks as simple and local are not correct. The case studies of Vaigai and Kothai Anicut system show that they are delicate and intricately connected to a larger geography. There are several technical nuances that are yet to be fully researched and understood in that regard. As we have found in chapter 7, a small change in Peranai *anicut*, and the storing of water in one place in a large reservoir in Vaigai basin to be released according to simplified calculations, did not result in an improved situation for the traditional users of the river Vaigai. Further, the so-called river modernization that claimed to reduce the waste of water as well as the need for farmers to keep building earthen bunds in every season has resulted in damage to the entire channel networks in Lower Vaigai region.

As we have seen in Chapter 6 and 9, even in the recent years, many interventions in streams and rivers are continuously challenged in courts. Constructing reservoirs to create huge storage capacity in head reaches, building low level bed dams in river beds, altering the hydraulics of *anicuts*, changing the sequences of tanks in chains, and altering tanks specifications are a few such causes of conflicts. Beyond these, the conversion of tanks into bus stands and other facilities results in another set of problems and conflicts reaching the courts. Destruction of channels, floods, drainage problems, and ground water scarcities has been some of the consequences of such tank conversions disputed in the courts.

Further, the legal documents (and the tank documentations) issued for tanks and channels under the land revenue laws were problematic and remain so. The technical documentations such as the Tank memoirs remain an unfinished and incomplete task. Chapter 4 and 5 shows that the many problems of encroachments, constricted channels, reduction of tank beds and channels has to be found in the law especially its use of every bit of land for revenue collections during the colonial rule. The courts as discussed in Chapter 6 do not go beyond the questions of property claims and the rights of parties including the government. Nothing is asked or understood about the larger technological issues involving the cases. The modern concepts such as sustainability and ecosystems etc. are seldom taken into account by courts. It shows that a thorough understanding about the technology does not exist in law and in the courts. Therefore, this study concludes that the technology behind the tanks, its linkages within a tank cascade, and the linkages with the river are neither fully documented nor understood but stereotypes are created about them without evidentiary basis.

The law takes a simplistic view that tanks and their components are landed properties defined and held through property rights. They are hardly treated and understood as water technology systems that require certain integrity to be preserved by the law. The integrity of tanks are least considered when conflicts come for resolutions before the courts.

Historically, land settlement laws divided the geographies with natural boundaries into different administrative zones in the form of *zamindari*s and *ryotwaris*, etc. This has led to major conflicts between these areas. Much of the landmark case law arose out of such a division and contributed to the rights of the government. Even though all types of land settlements are converted into *ryotwaris* after 1947 the impact of such a colonial divide is still seen in all rivers and major streams that supply water to tanks.

This research supports a view that river basins like the Vaigai are spawning regional conflicts between the former *zamindari* and the *ryotwari* areas because of water conflicts. The study brings a focused attention to this type of conflicts that has potential to politically destabilize the States as has happened in other parts of India[49]. The appreciation of such problems in the studies about Tamil

[49] The regional conflicts that is witnessed today in Telengana (in Andhra Pradesh) has some of its roots in water and tanks (Pingle 2010, 64; 2011, 128). Telengana was part of the princely state of Hyderabad under British India and had much of its borders with the Madras Presidency. In Telengana no consistent efforts were taken to improve the largely tankfed areas, but canal systems supported by large

Nadu is hard to find in academic literature[50] including the water law literature. So far other than a few observations made by journalists[51] such an issue of regional importance remain largely unconsidered. However, this research finds the gaps in knowledge is more than political neglect. They have a past, and must be attributed to the technological outlook of the time in tampering with rivers, *anicut*s and changing everything that is traditional without understanding them completely. As agreed by the government in 2006, the performance of all tanks below Peranai *anicut* (from former *zamindari* areas) fell substantially. In my view this poor dependability of tanks is more than a disaster created from the days of Periyar project (Seenivasan 2014).

However, specific studies on tanks with emphasis on local history and political ecology tend to differ in their understanding of this decline. Recent studies by David Mosse discussed and agreed about the reduced water availability to the lower reaches of Vaigai basin and yet draw conclusions that contradict admitted facts when he says: – 'the tanks in the region are looking better than before' (Mosse 2003, 299). Even after considering many factors such as the low investments in tank repairs, upstream developments and diversions, colonial interventions and other social factors like migration, etc., he finds there is no

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modern reservoirs came up in the same rivers in the adjoining Andhra. Similar water policy of having large technology projects was followed even after the colonial rule which resulted in this regional conflict leading to the bifurcation of the state itself.

[50] It is not my claim that the tank intensive regions were not studied and understood enough to foresee such regional conflicts. Areas like Vaigai invited the attention of many historians with their focus on understanding the 'historical processes' (Baker 1984; Dirks 1986; Price 1994). However, they have wholly missed these important water conflicts that have divided the basin into two opposing areas for the water from the river.

[51] P.Sainath (1996) made a passing remark that the "Plain political neglect and political failure to see the outcome for Ramnad of projects like the Vaigai dam have worsened the agony of this district" (Sainath 1996, 345).

environmental decline of tanks. How, then should we explain the reduced dependability from 71.43 % in 1889 to 33.33 % in 2001?

This research considers the specific role of law and the courts that supported a series of technological measures as the main reasons for this decline. This study has cited many such disputes since the days of Fischer's suit[52] (1908) to the recently resolved Manjalar dispute[53] (in 1997) from the same basin. The study shows many of the disputes in tank intensive basins like Vaigai has shaped the Indian water law to a major extent. Also this research finds the courts have acted very consistently (not arbitrarily as Mosse (2006, 84) would argue) in supporting *any and all* the government interventions in tanks. These interventions have destroyed the many technological principles on which tanks, tank chains and river links are formed and were functioning.

10.6 TECHNOLOGICAL SIMPLIFICATION AND THE CONFLICTS

Almost all streams and rivers are historically used by tanks. Water conflicts arise when new projects affected the existing ones negatively. The government as protagonists represented the new users and beneficiaries while the prior existing uses, who were disadvantaged, become the antagonists. New social relations (often conflicting) are created between newly created irrigation areas and the old ones. The new areas are always patronised by the government while the old ones were left on their own in a losing battle to defend their previous status. This phenomenon is noticed in all big projects after colonial rule.

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[52] Fischer's suit about controlling and altering Peranai anicut in Vaigai is a landmark case in Indian water law that paved the way for all future government actions in controlling the source of water for many tanks- the rivers in many basins.

[53] In this appeal by some tank villages against a dam project the Madras High Court ruled any suit against a government project was not maintainable in District Courts. This judgement in essence removed the rights of affected farmers to reach any civil court for a remedy.

It is not an exaggeration to say every medium and some major reservoirs in tank intensive areas like Vaigai relied on simplifications often based on limited data. In general, irrigation development in many rivers and streams feeding tanks use simplifications and generalisations[54] to create new projects. The estimates based on gross simplifications may have led to overestimations of available water in catchments leading to unending conflicts between the new projects and the old ones.

When adjudicating such disputes, courts accepted such approximations as valid, and did not give weight to the actual, ongoing practice. Since Indian laws do not recognise 'prior appropriation doctrine' - as in the American west (Wiel 1914) and in parts of Canada (Matsui 2005) - and many new projects affected the old and existing ones, conflicts became inevitable. Case studies of Vaigai basin in chapter 7 is an example wherein all medium and major reservoirs failed and also created the conditions for the pre-existing tanks to fail because of poor judgements based on simplifications.

During the colonial rule, the approximations and simplifications were used liberally to the advantage of the government to increase irrigated areas under their control, say the *ryotwari* areas as against the *zamindari* areas. Even at the cost of depriving the *zamindari* areas, the government pushed through its development efforts. After 1947, such simplifications continued to be used in bringing centralised bureaucratic control to projects like the Vaigai and many other reservoirs.

In the absence of complete technical information, many interventions in rivers affecting the tanks have brought either insignificant improvements or caused

[54] Studies in ICRISAT in the 1970s did demonstrate that there exist statistically significant variations in rainfall even between adjoining fields and hence the flows differ from each catchment. Also, Whitcombe says a similar estimation method followed in northern Indian plains proved to be wrong in some occasions (Whitcombe 1972, 25)

actual damage to them. The engineers and administrators apparently did not recognize the logic behind many structural arrangements in rivers, and in the name of modernizing they have brought immense damage of which some has become irreversible. This study demonstrates through Vaigai and the other case studies that the introduction of modern technologies and the rules and laws connected to them have invariably played a detrimental role in destabilizing tanks.

10.7 FUTURE DIRECTIONS

Tanks that survived for centuries are a form of 'manmade nature'. They have not been researched adequately by the modern hydrologists, ecologists and other scientists. These systems continue to serve the human beings for water, fuel, wood, fishery and so on. Research in sustainable development is yet to notice of tanks as something that has been sustained for centuries and to find what has sustained them for so long.

The attitude in ecological and ecosystem research seems to be focussed solely on concerns 'to conserve' the natural environments. Tanks as a subject worthy of ecosystem research is largely ignored, may be because of what Feenberg calls 'the paradox of the obvious' (what is most obvious is most hidden)'(Feenberg 2010, 6). The larger questions of understanding 'Tanks as ecosystems' is yet to find any meaningful appreciation in mainstream ecosystem research. This study has not come across any significant research in this regard even when the Millennium Assessment called for an assessment of all types of ecosystems (*Millennium Ecosystem Assessment* 2005).

Similarly, the hydrology research in a country like India is yet to notice tanks to be studied and documented as hydrologic systems. As Ven Te Chow, reminds his students, "Hydrologic problems directly affect the life and activities of large numbers of people. An element of risk is always present- a more extreme event than any historically known can occur at any time. A corresponding responsibility rests upon the hydrologist to provide the best analysis that knowledge and data will permit (1988, 17)". Tanks do affect millions of families. Risks of water scarcities are growing by the day. Yet Indian hydrologists are yet to notice this basic advice to create data on tanks.

Therefore, based on this research I suggest three areas for future research as necessary- understanding the reasons for resilience of tanks, understanding tanks as ecosystems, and understanding tanks as hydrological systems.

GLOSSARY OF LEGAL AND INDIAN REVENUE TERMINOLOGY

A- Register: Permanent register of a revenue village. The register details the name of *pattadar* or landholder for every survey number of lands within the village.

Absolute Right: The right that cannot be interfered with lawfully, no matter how important public interests in doing so might be.

Acre: Areal measurement equals to 0.4047 hectare

Adangal: Annual village cultivation records detailing each survey number, crops and seasons

Affidavit: Statement confirmed by oath normally submitted to a court as evidence

Agreement: A coming together of two parties as a final determination

Anicut: A dam made across a stream or a river to divert waters into channels leading to tanks or fields

Anubhavam: Enjoyment; a grant of hereditary land in reward of service (also *Anubhogam)*

Anubhogam (Anubogam): Enjoyment, usufruct; a grant of land etc., the same as *anubhavam*

Appeal: The right of entering a superior court and invoking its aid and interposition to redress the error of the court below

Appellant: A person who appeals; one who appeals against a decision

Aquifer: A fissured deposit or any other underground formation yielding water for wells or springs

Ayacut: Irrigated area under a particular irrigation work.

Ayacutdar: Persons having lands in the *ayacut* area

Basin: Geographical area drained by any river or a stream

Case law: The law established by the outcome of the former cases also called judge made law. In India, the decisions of High Court, Supreme Court and the former Privy Council decisions are considered legal precedence and a case law

Case: Includes a suit or any proceeding before a court or any revenue or judicial authority

Catchment: The geographical area from which rainwater drains into a tank or any other reservoir

Chain of tanks (also tank cascade): A group or series of tanks share a common channel either to draw or dispose waters

Channel: A natural or artificial groove, ditch or conduit for the flow of water; also a water course or a field channel if runs within a field; called river channels when takes off from a river

Civil court: The courts established to decide purely civil questions between persons seeking their civil rights

Collector: Administrative chief of a district

Common law: A body of law rooted from customs and conventions recognized through the decisions of court of law in contrast to legislative enactments

Commons: Properties owned by several people jointly

Co-owner: A person who is in concurrent ownership, possession, and enjoyment of property with one or more others

Counsel: A lawyer appointed or engaged to advise and represent in legal matters

Cross objection: An objection filed by the respondent in an appeal against the findings in the judgement appealed against

Custom: It is unwritten law established by long usage and consent of the ancestors; and an act which is accepted by the people as a right

Damages: The sum of money claimed or adjusted to be paid in compensation for loss or injury sustained

Decree: An official order issued by a legal authority, a judgement or decision of certain court of law

Deed: A written or printed document between parties contracting under the hand or issued under the seal of the obliger

Defendant: A person who is sued in the court of law

Document: It shall include any matter written, expressed or described upon any substance by means of letters, figures or marks, or by more than one of these means which is intended to be sued, or which may be used, for the purpose of recording that matter- *e.g.* orders, circulars, maps, survey sketches, project reports etc.

Easement: An easement is a right which the owner or occupier of certain land possesses, as such, for the beneficial enjoyment of that land, to do and continue to do something, or to prevent and continue to prevent something being done, in or upon, or in respect of, certain other land not his own

Estate: Any permanently settled *zamindari* land under the Land settlement laws

Fasli Year = Gregorian Calendar Year – 590 i.e. the current fasli (July 2013 June 2014) minus 590 = 1423.

Fasli: A Year starting July 1, (of the present) and ends in the June 30 (of the following) year. Fasli year *arrived by adding 590 to the Gregorian year.*

Field bothie /field channel: Any water course (including the underground or over ground pipes) having a capacity of not exceeding one cusec (cubic foot per second) of discharge drawing water from any irrigation work including wells. The term also includes any and all subsidiary channels and pipes belonging to the field channel but not the main channel from the sluice.

Foreshore: Land immediately adjoining the full tank level (FTL) or full reservoir level (FRL) of the tank or a reservoir

Full Tank level: Level of water in the tank when the water touches the crest of the surplus weir

Ground water: Water below the ground also called subterranean water

Impleading: Claiming to include one as a party to a case, though his or her name is not in the case

Inam: Favor, reward or gift. The beneficiary of an *inam* is called *inamdar.* Also refers to the land settlement given as an *inam* for a specified purpose by the government.

Injunction: An order of the court retraining the commission, repetition and continuation of a wrongful act of the defendant

Inter se: Between or among themselves

Irrigation cess: A fee paid by every landholder under the irrigable command of an irrigation work for the facility provided by the government for getting water to the fields

Irrigation laws: Bunch of laws covering Acts, rules, orders and instructions related to irrigation works. It is also a subset of water laws.

Judgement: A determination of a court or a tribunal declaring the rights to be recognized and the remedies to be awarded between the parties upon facts found by the court or admitted by the parties or upon their default in the course of proceedings instituted for the redress of a legal injury.

Jurisdiction: The power of a court or judge to entertain an action, petition or any other proceeding. Also signifies the district or geographical limits within which the judgements or orders of a court (or an authority) can be enforced or executed.

Kamalai: Also called *Mhote*. A large leather cum iron bucket hauled up and down the well by a pair of bullocks walking on a sloping ramp.

Kanmoi or Kanmoy: Tank

Kudimaramat: Practice of maintaining irrigation and other village works by local custom. Usually performed as labour work by men and women on specified time and days to do tank repairs, channel cleaning and closing flood breaches.

Lake: A water storing body *but* differs from a tank. Normally, lakes are naturally formed or formed in depressions. Tanks are entirely manmade and use gravity flows to deliver water for irrigation which a lake may not do.

Landowner: Person in actual possession of the land.

License: A formal permissions issued by an authority to do something.

Localisation: Allocation of land proposed to be served by an irrigation project. It could be perennial, irrigation or seasonal irrigation meant for wet crops (paddy, sugarcane, betel etc.) or dry crops (cotton, sorghum, ragi etc.)

Locus standi: A right of appearance in a court of justice. A person must have sufficient interest to sustain his or her standing to sue.

Mamool: Regular. Also could mean a custom.

MCft: Million cubic foot equals 28.32 MCM (Million cubic metre)

MCM: Million cubic metre

Munsif court: A court lower than a district court

Murai nir: Supply of water for irrigation in settled order or rotation.

Murai: Legality, lawfulness; turn, alternative, rotation.

Outlet: A point of diversion of water to a field (usually from a channel taking off from a sluice)

Panchayat: An institution of local self government constituted under Article 243 B of the constitution of Indian for the rural areas. [Also could mean a traditional organization meant for deciding disputes, e.g. fishermen Panchayats, caste Panchayats etc.]

Patta: A bill that reveals the revenue assessment payable to the government. Also indicates the name of the land holder.

Pattadar: A person holding a *patta*.

Percolation: The process of deep infiltration of part of rainfall that enters the soil.

Petition: A written application asking for relief or remedy

Picotta: Bailing stand for drawing ground water or river water

Plaintiff: Persons who brings a case to a court

Plot: a piece of land usually identifiable through land revenue documents

Pond: A stagnant pool of water mostly used for domestic water uses. May or may not be connected to a tank or a channel

Poramboke or Puramboku or Poremboco: Portions of an estate or lands liable to revenue as do not admit of cultivation, and are therefore exempted from the assessment. Usually, sterile or waste lands, rocky outcrops, wilderness, site for future dwellings, and the like. Also common land near a town or any place situated out of or beyond certain limits.

Prescription: A title acquired by use and time, and allowed by law.

Proprietor: Person with exclusive title to do anything with the property

Public Interest Litigation (PIL): A litigation at the instance of a public spirited citizen espousing the cause of others, as an exception to the traditional view that a petition should be maintained by an aggrieved person.

Ramnad generally connotes a region comprising of the present day districts of Sivagangai and Ramanathapuram. Until 1947, they were two different *zamindaris* under colonial rule. Between 1947 and 1985 they were in a single district named as Ramnad.

Respondent: A party called upon to respond or answer a petition, a claim or an appeal.

Rotational water supply: A system of distribution of water to users by turn according to the approved schedule, indicating the day and duration of supply. Also called turn system.

Ryot: The person whom the government enters into direct engagement under *ryotwari* system. He holds land for the purpose of agriculture on condition of paying to the government the assessment that is legally due upon it.

ryotwari land: Lands settled in the *ryotwari* land settlement areas

Sluice: A water gate or flood gate or a opening to pass water (mostly for irrigation)

Suo motu: On its own without any party approaching for it

Supreme Court: The apex court of India

Tahsildar or Thasildar: An administrative head at the taluk level involved mainly in revenue collection under the authority of the District collector. Also called Taluk Magistrate when he hears cases related to revenue disputes.

Tax: Money paid by citizens to the government for public purposes.

Time immemorial: Indefinitely ancient; a practice that existed from the time out of mind.

Usufruct right: Rights of usage or operational right

Village: A human settlement. Larger than a hamlet, but smaller than a town.

Warabandhi - weekly turn system of irrigation

Water course: A channel built at government expense.

Water table: The surface of the zone of saturation of ground water

Water years: A water record extending over a continuous period of 12 months from June 1 to May 31. Sometimes vary depending on the reservoirs.

Well: A small pit or hole excavated or drilled from the surface of the ground to obtain water

Writ of certiorari: A writ of Supreme Court or a High Court to any constitutional, statutory or non-statutory body or person, requiring the records of any action to be confirmed by the court or dealt with according to law.

Writ of mandamus: A written command or formal order issued by a court, directing or enjoying the person(s) to whom it is addressed to do or to refrain from doing some act specified therein.

Writ: A form of written command or formal order issued by a court, State, sovereign, etc.

zamindar: An individual appointed as revenue collector to collect and remit land revenue on behalf of the government in the specified villages settled as *zamindari* estate or *zamindari* village.

ANNEXURE

Annexure 1. Copy of Tank Memoir[1] for MelaKuilKudi Kanmoy

Kundar Basin	Madurai District
Thekkar minor basin	Madurai south taluk
Latitude : 9^{o} 55’ 16’ N	Ettunali kanmoi group
Longitude: 78^{o} 1’ 47’’ E	S.F. no. 1
Village No.130	Melakuilkudi

Situation: This tank is situated about 1 km South of Alampatti village a hamlet of No.129 Karadipatti village in the Madurai South Taluk. This can be reached through the cart track from Alampatti and is situated about 11 km from Madurai in Madurai Usilampatti road.

Source of supply: It receives the drainage from its free basin besides the surplus of 6 upper tanks immediate being no. 154 Marudani kulam, 58 Vadagukulam and 57 Pottakulam.

Surplus Arrangements: The tank surpluses over a B.C weir [Broad Crested weir] 8.10 m long at L.S 12 m [Longitudinal Section] from left flank and also over a weir with Dam stones 23.5 m long at L.S 25 m from left flank. The surplus arrangement is insufficient. It is proposed to correct the weir No. 1 H.C weir [High Coefficient Weir] and extend 4.00 m at the left of the existing weir as narrow crested weir. The discharge through the surplus work is 100 % now. The surplus from the tank flows through the surplus channel and falls into no. 52 Kilakuilkudy Kanmoi.

It is proposed to convert the weir No. 1 as H.C weir and extend 4.00 at the left of

[1] I have made a visit to the tank in 15 October 2010. As specified in this memoir, all the alterations proposed for sluices and weirs were completed after 1986. The village is a known heritage site for having Tamil Jain schools of the 7-11th century A.D in the nearby. Partly destroyed remnants of an ancient sluice built with bricks can also be seen closer to the sluice 1.

the existing weir as a N.C weir[Narrow Crested Weir].

Bund: The bund for this tank is 1400 m long and L.S. 0 starts from 122 m left of this existing weir. The bund from L.S. 0 m to L.S. 1400 m will be 1.25 m above M.W.L [Maximum Water Level] with top width of 2 m. The side slope will be 1½ : 1 in front and 2 : 1 in rear. There is a cart track at right flank which connects Melakuilkudi village with Karadipatti.

Vegetation: The vegetation on bund will be cleared as far as necessary to allow for the execution of earth work.

Revetment: The front slope of the bund is reverted form L.S. 290 m to L.S. 1100 m with its top level at 0.375 m above M.W.L

Sluices : Irrigation is carried on by 2 sluices:

Sluice No.	At LS	Type	Vent size	Dia of plug	Barrel size	Sill level
1	485 m	Tower head	0.15 x 0.15	0.15	0.65 x 0.90	152.735 m
2	1014	Tower head	Three vents 0.15 x 0.5	0.15	0.25 x 1.0	151.295 m

F.T.L: F.T.L [Full Tank Level] is fixed at 155.390 m with reference to the mean sea level and with reference to the average bed of crest of weir No.2 with dam stones.

Standards to be maintained

F.T.L - 155.390 m M.W.L [Maximum Water Level] - 155.990 m

Top of bund - 156.990 m from L.S to L.S. 1400 m

Top width - 2 m from L.S. 1400 m

Side slope - 1½ : 1 in front and 2 : 1 in rear

Height of revetment above M.W.L - 0.30 m

Bench Marks

Bench mark I: On crest of weir No.1 left end at L.F. [Left Flank] 155.505 m

Bench mark II: On top of platform sluice no:2 at LS 1014 m 155.090 m

Datum mean sea level: Bottom of cut stone slab of bridge No.36 at km 15/8-9 on Madurai-Bodi [Train] line + 165.735 m

Permanent Bench mark connected to M.S.L. [Mean Sea Level]

1) Bench on left flank + 154.805 m
2) Bench mark on right flank + 155.930 m

Maximum discharge to be provided for surplus arrangements:

Co-efficient C = 7.50; c = 1.50

Area of free basin - 3.46 sq.km

Combined catchment area - 14.13 sq.km

Maximum discharge from channel – 43.84 cum/sec

Total discharge to be provided - 43.84 cum/sec

Effective length of masonry escapes - 8.1 + 23.5 = 31.60 m

Proposed additional length of masonry escape – 4.00 m

Discharge over total length of masonry escapes – 43.84

Details of storage:

Area of water spread at F.T.L – 0.348 m.sqm

Maximum width of water spread at F.T.L – 802 m

Capacity of tank at F.T.L - 0.509 m

Total yield - 0.619 MCM

No. of fillings – 1.21

Total annual storage - 0.619 MCM

Capacity of tank above - 0.5716 MCM

No. of wells in the *ayacut* - 60

Details of Irrigation:

Registered *ayacut*

Single crop – 110.90 ha

Average cultivation

Single crop – 81.10 ha

Proposed ultimate area – 110.90 ha

Water stored per ha. - 0.0056 MCM

Level of sluices

1. Sill of sluice No:1 from the left flank - 152.795 m
2. Sill of sluice No: 2 from the left flank - 151. 295 m

General Remarks:

Bund: The bund may be brought to standards. To avoid out flanking the bund may be extended at right for a length of 62 m at right flank from the existing bund.

Surplus Arrangements weir No:1 – It is in fair order. It is a wing wall type with wings and abutment are at low level. This require raising.

Weir No: 2: This is in fair order. This is provided with dams ones. Disturbed portion may be repacked with stones. Calingulah stones serves no purpose and this can be removed. The weir connected to bund only at right side and the abutment and wing are to be raised to T.B.L. There is one vent in the Body wall with a size 0.14 x 0.3 m to serve as a sluice if needed.

Provision for additional surplus works:

The existing surplus works are insufficient to discharge the maximum in flow. Hence it is proposed to extend the weir No.1 at left for a length of 7.5 m to discharge the balance of 6.04 cum/sec.

Sluices : There are two sluices for this tank of tower head type.

Sluices No.1: This is in fair order rear cistern. The rear head wall may be raised to avoid sliding of earth into the cistern in rear. Plug and plug rod may be provided

Sluices no.2: This is in fair order rear cistern. The rear head wall only be raised to avoid sliding of earth into the cistern in rear. Plug and plug rod may be provided. Tower head require bank connection for early approach. Rear cistern masonry has guide way at bottom and this require plastering.

Source: (Public Works Department 1985)

ANNEXURE 2. FRAMEWORK FOR THE STUDY

Research Question: What are the laws that govern these systems and deal with conflicts; how and why such laws came into place; Do they exist in any coherence as a planned instrument or derived from many sources - as the situation warrants; What rights the various actors (state, its institutions and agents, community, individuals and others) have with respect to tank systems?
Legal analysis of the Regulations, Acts, Rules, Orders and Case laws related to tanks and water
1. **Statute Laws** *Madras Permanent Settlement Regulation 1802; Madras Compulsory Labor Act 1858; Madras Land Revenue Assessment Act, 1876; Madras River conservancy Act 1884; Madras Land Encroachment (Prevention) Act, 1905; Periyar Irrigation Tanks (Preservation) Act 1934; Tamil Nadu Irrigation Works (Repairs, Improvement and Construction) Act 1943; Irrigation Tanks (Improvement) Act 1949; Tamil Nadu Panchayats Act 1994; Tamil Nadu Irrigation works (construction of field Bothies) Act 1959; Indian Easement Act 1882; Code of civil procedures 1908; Indian Penal code 1860;* 2. **Board Standing Orders (BSO) [related to Land, Water and Tanks]** 3. **Case Laws** made by the High Court, Supreme Court and Privy Council on Tanks and Tank Conflicts
Research Questions: What are the water conflicts in tankfed areas; why do they arise? And how do they get expressed? What defines a technology – modern or traditional in the context of time and space?; What are the consequences of modern technology interventions such as dam building, altering river hydraulics, establishing river control mechanisms etc.

Contd..

CASE STUDIES AT THREE LEVELS		
Macro-level: Vaigai basin		
Technological interventions	**Social Conflicts**	**Source Documents**
• Completion of Periyar reservoir & Periyar flowing into Vaigai (1895)– New areas benefitted; • Changes to hydraulics of Peranai *anicut* (1899-1908) inviting Fischer's court Action; • Completion of Vaigai reservoir (1959) and New water accounting process- preceded by series of farmers agitations; • Modernisation of Vaigai river, and altering river hydraulics in Lower Vaigai (1969) through 2 main regulators and several headworks; • Destruction of the modernised channels and consequent problems for Lower Vaigai • Completion of medium irrigation schemes and reservoirs - Manjalar (1967), Marudhanathi (1979) and Sathaiayar (1965) • Modernisation of Periyar main canal and command areas – Extending Periyar commands (1982-1995) • Water Resources consolidation Programme re-fixing Vaigai river channels (2004)	• Fischer's suit (1908) – *ryotwari* and *zamindari* divide • Agitation and political debates against Vaigai reservoir (1952-59) • Agitation and court cases against medium schemes – court cases (1967-1996) • Periodic struggle for getting water to Lower Vaigai – and repairing Vaigai channels (1959- ongoing) • Court cases for Manjalar waters (1969-1997) • Court cases for change of rules in Vaigai–(2010)	Archival documents related to Periyar Vaigai Project; Government orders, correspondences, reports; Original project documents related to the major interventions; Judgements related to major disputes; Court petitions of the ongoing litigations; Reports of Consultants, and research institutions.

Contd..

CASE STUDIES AT THREE LEVELS		
Meso-level: Kothai Anicut (Varadhamanathi sub basin)		
Technological interventions	**Social Conflicts**	**Source Documents**
• Controlling the stream: The free flowing stream of Varadhamanathi is dammed and a reservoir built (1979) • Headworks to control the stream and feeder channels of tanks (1979) • Reduction of Tank capacity: Dismantling part of tank bed (1990 and 1994) • Reduction of Tank capacity: Dismantling of tank bed for Bus stand (1998) • Encroachments for houses, toilets and sewage inlets (1998-2009)	• Temporary encroachments on bund and bed began 1965; • Letting sewage into big tanks started (1979); • Series of protests by farmers not to dismantle the tank bed (1992-97); and (2007-2009) • Litigation between farmers and government; Farmers and Encroachers. First round (1992-97) and Second round (2008-2009)	Government reports, project documents related to the reservoir; Farmers petitions, Minutes of meetings between farmers and government officers, Court petitions of the ongoing litigations; Pamphlets issued by agitating farmers; Tank memoirs of the PWD
Micro-level: Tanks in Madurai, Ramanathapuram, Viruthunagar districts		
• Dismantling of tank beds and channels • Amending revenue records and maps • Altering the location of sluices and closing of field channels • Construction and damaging of sluices • Restoration of channels • Dismantling cart tracks leading to tanks	Litigation between – • tank user farmers and individuals • individual pattadars and government departments • lower and upper tanks/villages	**Court petitions and judgements**

ANNEXURE 3. POINTS/QUESTIONS TO GUIDE FOCUS GROUP DISCUSSIONS

The following list of questions are to guide the group discussions. The issues in each of the focus group varied, and hence those points/questions were explored in detail. The discussions are audio recorded. The data from the discussions were used to supplement and confirm other data collected and used in the case studies.

General questions about your tank

1. Describe about your tank: The tank and its importance, tank cascade and inter-linkages, and other water resources such as wells etc.

2. Describe about your Agriculture: The crops, cropping patterns, and any other prominent farming activities in the tankfed lands.

3. Describe about your Maintenance and management: done by the government/Panchayat; any collective effort by the villagers/associations; with some examples of recent maintenance and development work and its experience.

4. Explain about your supply channel networks: Any history of excavation, maintenance, and any other developmental work in the tank and the tank cascade. Any history of collective work by the tank users and other tank users in the cascade.

About issues affecting your tanks

5. What are the issues of conflict within your tank:

    - encroachments: where is it?; who are involved? ; and how does it affect the channel/tank performance;
    - water appropriation: is it fair within the tank *ayacut*?; issues with other tanks, how does it affect their tanks
    - enjoyment of usufructs- how is it appropriated now?; how was it in the past? Any issues that affects the enjoyment? What is the response of the Revenue Department/ PWD/Panchayats – do they allow or not? What is the ideal way of enjoying the usufructs

6. What are the conflicts between tanks within the chain?

    - Conflicts for acquiring water: List the conflicts between the tank ayacutdars with other users; with other villagers; with other tanks in the cascade.

- Conflicts over disposing excess water:
- Conflicts for usufructs: List them with their reasons. What are they? How are they dealt? What stage they are?

7. What were the attempts in dealing/resolving these conflicts?
    - efforts within the village; between the villages; approaching the local government functionaries, and the departments such as Revenue Department, Forest Department, Irrigation department, Mining department, and village Panchayat.
    - any untoward incidents- quarrels, or and any serious violence; details, parties concerned, what stage is it now? Scopes of remedy as you think? What do they want to be done to resolve? Efforts by themselves and any mediators so far.

About the past projects

8. Tank Development Projects:
    - Technical interventions made in the recent past by the government: Examples include: shutter gate arrangements in the supply channels; lining of channels; construction or modification in the tank sluices; modifications in surplus arrangements and weirs etc.
    - Effect of such development: how far are they beneficial? What effects it had on water resource and their uses – did it resolve any conflict or create one?

Status of other conflicts

9. Details of ongoing or any other potential conflicts within the village, in courts and other forums – Peace committee meetings.

About the future

10. What do you think appropriate mechanism (legal or otherwise) to resolve issues such as water appropriation, enjoyment of usufructs and other resources of the tank.

ANNEXURE 4. FOCUS GROUP DISCUSSIONS IN VILLUR CHAIN OF TANKS

Sl. No.	Name
Thennamanallur village: ***FGD held at Panchayat Office,*** **06 January 2012**	
1	M.Chandramariappan, former President and Present Panchayat Accountant
2	T.Duraipandi, Farmer
3	C.G.Ayyar
4	S.Kannan
5	S.Karthikeyan
6	M.Mahalingam
7	Latsumanan
8	G.Ramar
9	R.Karunakarapandiyan
10	V.Barathan
11	V.Palanimurugan
Villur village: ***FGD held at Village Chavadi,*** **23 December 2011**	
1	S.Kandasamy
2	M.Kandasamy (1)
3	R.Karanthamalai
4	V.Periyasamy
5	S.Balamurugan
6	A.Pandi
7	R.Srinivasan
8	L.Malaichamy
9	M. Kandasamy (2)

Sl. No.	Name
10	S.Sethuraman
11	Su.Kandasamy
12	V.Palani
Uvari village: *FGD held at Village Maidan*, 05 January 2012	
1	P.Muniyandi
2	V.Muthukamatchi
3	K.Palanikumar
4	Karaimurugan
5	C.Gurusamy
6	M.Gurusamy
7	P.Periyakaruppan
8	M.Murugesan
9	P.Pitchai
10	Muthukaruppanan
11	Sankaralingam
12	M.Sangaiya
13	S.Pandy
14	M.Kathirvel

ANNEXURE 5. FOCUS GROUP DISCUSSIONS IN SELVANUR TANK CASCADE

Sl. No.	Name
Uvari village: *FGD held Kumaraiya's house* on 12 February 2012	
1	M.Krishnan
2	K.Madurai Veeran
3	V.Kumaraiya
4	Ganapathya Pillai
5	Ayyan Kannu
6	Marumuthu
7	P.Govindan
Chithudayan Village: *FGD held at School* on 12 February 2012	
1	Ulagamuthu
2	O.Karuppusamy
3	C.Palraja
4	R.Palraj
5	Ve.Villi
6	S.Thangavelu
7	K.Velu
8	U.Subburaj
9	R.Malairajan
Kootaiyendhal Village, Interviewed on 12 February 2012	
10	K.Govindan, Secretary, Kottaiyendhal Tank Farmers Association

Annexure 6. Questionnaire: Unstructured Interview with Tank Experts, Engineers, Government Officers, Development agencies, Panchayat Representatives

Interviews with experts who have direct, and hands on experience in dealing with tank conflicts are undertaken. This method is a complementary tool to other methods already discussed in the proposal.

The questions include the following:

a. The general situation of Tank irrigation in the district/state/country

b. Your views on the reducing performance of tanks and their possible reasons?

c. How significant are the tank conflicts in contributing to the decline of tanks?

d. What are those important tank conflicts you have come across?

e. What roles do you see for the farmers themselves in reducing, redressing the conflicts?

f. How good are the existing laws to deal with tank conflicts arise at various levels? Example: within the villages; across the villages; dealing with the encroachers; dealing with the dumping of urban sewages and solid wastes; dealing with discharging of industrial effluents and dumping.

g. What role do you see for the government, non-government developmental agencies and farmers associations in conflict resolution?

h. How good are the technical improvements (supposedly aim at increasing the efficiency and reducing the water conflicts) undertaken in the prominent project such as EU funded MOTI, World Bank funded WRCP, and IAMWARM?

   Examples: Weir modifications, shutter arrangements in supply channels, lining of channels & On-farm development works etc.

i. What role do you see for the well irrigation (that is also declining due to poor recharges from the tanks)?

j. About the legal aspects: What do you think about the existing legal remedies in dealing with water conflicts arising out of encroachments and dumping.

ANNEXURE 7. EXPERTS, ACTIVISTS AND PROFESSIONALS ON TANKS INTERVIEWED FOR THE STUDY

Sl. No.	Name	Date
1	Mr.Raghunathan, Secretary, All India Kisan Sabha, Ramanathapuram	15 September 2001
2	Mr. K.Vallinayagam, Retired Additional Director of Panchayats and noted legal expert on Panchayat Laws in Tamil Nadu	08 November 2011
3	S.Muthukrishnan, Vaiyur, Retired Village Administrative Officer worked in Madurai and Theni district	25 January 2012
4	Er.D.Manickavasagam, Assistant Engineer, Agricultural Engineering Department, (CADP & Farmers Organizations) Palani, Dindigul district	06 January 2012
5	P.Govindan, President, Ramnad District Tank Farmers Federation, Mudhukulathur, Ramanathapuram district	12 February 2012
6	A.Gurunathan, Programme Leader, Tank Development Programme, DHAN Foundation, Madurai	15 February 2012
7	Dr.R.Sakthivadivel, Consultant to Tank Programmes; Pioneer of tank research programmes in Anna university, Chennai	17 February 2012
8	Dr.K.Sivasubramanian, Consultant to IAMWARM Tank Programme and Faculty in MIDS involved in Tank research	17 February 2012
9	N.Rajasekaran, Team Leader, DHAN Foundation Tank Development Programme, Thirumangalam	03 March 2012
10	Dr.M.S.Swaminathan, Member of Parliament, and noted Indian agricultural scientist. Former Director General of Indian council of Agricultural Research	20 July 2012

ANNEXURE 8. INTERVIEWS WITH FARMERS FROM KOTHAI ANICUT SYSTEM

Sl. No.	Name	Date
1	Mangala Gounder, Landlord and noted Pattadar in Vaiyapurikulam tank	16 January 2011
2	C.Rathinam, Secretary, Vaiyapurikulam Karaipathupuravu Association	14 February 2012
3	Karuppanan alias K.Karuppaiah Thevar, Leading farmer in the Vaiyapurikulam tank command	14 February 2012
4	A.Sivasubramaniyan, Farmer from Vaiyapurikulam tank	14 February 2012
5	M.Kasiviswanathan, Leading former and Vice President of Vaiyapurikulam Karaipathupuravu Association	14 February 2012
6	Mr. Chockalingam, President of Vaiyapurikulam Karaipathupuravu Association	14 February 2012
6	Visits to Varadhamanathi reservoir and walkthrough the channel done three times to develop a proper understanding of the system. Each time with five different farmers	January 2011; 15 December 2011; 01 February 2012

ANNEXURE 9. IMPORTANT LAWS AFFECTING TANKS IN TAMIL NADU

Statutes related to establishment of the Board of Revenue

Board of Revenue Regulation (I of 1803)

This Regulation established the Board of Revenue to administer land, water and all other connected issues.

The series of decisions taken by the Board is issued as circulars and compiled as Board Standing Orders.

Tamil Nadu Board of Revenue Abolition Act 25 of 1980

This law abolished the Board of Revenue (on 05.11.1980). All the BSO stands valid and continue until specifically repealed or modified through the appropriate authority.

Section 4: the Board is replaced by an 'appropriate authority';

Section 2 defines the appropriate authority and the same shall be constituted by the government from time to time. [Unlike the Board of Revenue, there is no fixed authority at this time]

Section 2 also defines the appropriate authority as any and all of the following: (i) the Commissioner (ii) any officer not below the Additional Secretary to government or (iii) any officer no below the district collector.

Revenue Board Standing Orders (BSO) relevant to tanks

BSO 1 Rates of Assessment of lands

1.1 Principles of *ryotwari* settlement
1.2 Arriving government demand
1.3 What the government demand (share of produce) represents
1.4 Period of settlement (Permanent)

BSO 4 Water cess on dry lands

4.10 No government water is to be taken without sanctions by the government

4.13 Use of streams in reserved forests [done only under license issued by Forest Department and the Collector]

BSO 5 Assessment for Second crop (in wetlands)

BSO 6 Private Wells

6.1 [No] Tax on lands irrigated from private wells: [Free of all taxes but encouraged to dig wells anywhere as pleased]

BSO 7 Use of water for irrigation in works not constructed by government

7.1 Natural rights: [applicable to water generated in private lands without affecting government works/tanks]

7.2 Permissions to use water from, government sources including (i) natural pools in government lands and (ii) minor streams (iii) all other sources

BSO 8 Private repair of ruined and rainfed government tanks

8.1 Definition of a ruined tank

8.3 Definition of rainfed tank

8.4 Public Works Department (PWD) to be consulted [when any private work affect government works]

8.8 Repairs of tanks by village community – [applicable conditions]

BSO 79 Relations (of Revenue Department) with the PWD – General procedures

79.1 Collector to be consulted while preparing the budget for irrigation works

BSO 84 Control of Water supply

84.1 In whom vested:

[Tanks irrigating above 100 acres with PWD and less than 100 acres with Panchayat Union Councils]

84.2 Right of government to regulate the distribution of water [Collector has to do]

84.3 Restriction of irrigation in seasons of short water supply [Collectors are responsible]

84.4 Important Decisions of High Court to be followed [Case laws to be followed]

From *Robert Fischer versus Secretary of State*, *In High Court of Madras 2 Ind Cas 325*:

- Government's right over water is paramount
- Riparian owners in government works can only seek damages when there is a proof

From *Secretary of State v P.S. Nageswara Ayyar, In the Madras High Court [1936] AIR Mad 1923*

- Customary rights cannot give exclusive right;
- Prescriptive rights are not valid against government;
- *ryotwari* holder is ordinarily entitled to his customary supply of water, but the corresponding obligation to provide water by the government is negative; [*ryots* need to pay without fail but the government need not honour to deliver water]
- Power of the government to interfere with customary supply of water should be determined, ***however***, with reference to the accustomed supply user ***and not with*** reference to the registry. [No prescriptions be honoured if the government desires to act against it]

BSO 86. Conservancy of government works of irrigation

86.1 Irrigation works other than those under control of Panchayat Union Councils or Panchayats. [Revenue Department is responsible]

86.2 Minor Irrigation works under the control of Panchayat Union Councils or Panchayats [Panchayat union is responsible]

86.3 Temporary dams on *Calingullas* of Government Works [Collector is responsible]

86.4 Encroachments on Tank bunds [Collectors should remove]

86.5 Customary Labour [Collectors should mobilise such labour in all places; In Panchayat tanks the Commissioner of Panchayat Union shall also do]

86.7 Planting on the margin of the water-spreads [Forest Department is responsible]

86.8 Communal privileges in tank beds [allowed for grazing and cultural uses for villagers]

87 Maintenance of Minor Irrigation works

87.1 List of Minor Irrigation (MI) sources [Collector has to maintain a complete list at all times]

87.2 Standing Ledger of minor irrigation works [Collector has to oversee all repair and development of works, in all tanks in his jurisdiction irrespective of whomever it is vested with; Collectors have to assess the financial estimates of every tank rehabilitation works irrespective of the scheme or funding undertaken by any agency of the government within the district]

88 New Irrigation Projects

88.1 All new projects need to be investigated only by PWD but in consultation with the Collector. For medium and major projects, a Thasildar reporting to Collector will be attached to the investigation team.

89.Quarrying in government and private lands

89.4 Powers and duties of Panchayat Union Commissioners. [The commissioner as officer of the Block Panchayat is given the same power as that of a Thasildar to allow gravel mining and desiltation from tank beds *only up to a value of Rs 25*. Since the sanction power is so lowly, only the Revenue officers under Collector do it at all the time].

202. Preservation of the Great Trigonometrical survey stations and Bench Marks [to be done by the Village Officers under the Collector]

209 Occurrence of floods and [how to deal them; including breach closing in tanks and river banks to be done by the Collector]

211 Disposals of Fisheries by Lease [Only by lease]

ANNEXURE 10. STATUTES AFFECTING TANKS: STATE LEVEL ENACTMENTS

1. ***Madras Permanent Settlement Regulation 1802***

   An Act to regulate proprietary right of lands to be vested in individual persons and for defining the rights of such persons, under a permanent assessment of the land revenue.

2. ***Madras Compulsory Labour Act 1858***

   An Act to make lawful compulsory labour for the prevention of inundation by tanks, channels and rivers and to enforce customary labour for irrigation.

3. ***Madras Land Revenue Assessment Act 1876***

   An Act to make better provision separate assessment of alienated portions of permanently settled estates

4. ***Madras River conservancy Act 1884***

   An Act to conserve rivers. Prohibits mining of rivers, damages to river bunds and beds

5. ***Madras Land Encroachment (Prevention) Act 1905***

   An act to prevent and remove encroachment on government properties.

   Section 2: Defines tanks and rivers as government property

6. ***Periyar Irrigation Tanks (Preservation) Act 1934***

   An act to provide efficient irrigation in tanks fed by Periyar system.

   The sill levels of sluices, crest levels of weirs are allowed to change under the Act.

7. ***Tamil Nadu Irrigation Works (Repairs, Improvement and Construction) Act 1943***

An act to provide for the improvement of private irrigation works, the construction of new irrigation works on private lands and the supply of water from the government to private irrigation works.

8. ***Irrigation Tanks (Improvement) Act 1949***

An act to enable the government to increase the capacity and efficiency of all tanks in the state.

Section 3: Government is vested with powers to increase the capacity of any tank, or efficiency of irrigation tanks.

Section 4: No Court shall entertain any suit or application for the issue of any injunction to restrain the exercise of any powers conferred on the Government by Section 3.

9. ***Tamil Nadu Panchayats Act 1994***

An Act to establish Panchayat administration, which also has certain duties and responsibilities related to tanks. Previous versions of the law are *Madras Village Panchayats Act 1920, Madras Village Panchayats Act 1950 and Madras Village Panchayats Act 1958.* As far as tanks are concerned all provisions are same in all the three Acts. No change since 1920.

> Section 110(g): duty of the village Panchayat to provide water by repair and maintenance of tanks;
> Section 132: Vesting of communal property or income in the village Panchayat.
> Section 133: Maintenance of irrigation works, execution of *kudimaramat* (local community management), etc. **[done through BSO 86.1]**

10. ***Tamil Nadu Irrigation works (construction of field Bothies) Act 1959***

An Act to define and improve the field bothies (channels) from sluices of tanks and canals.

Annexure 11. Central Enactments affecting Tanks

1. Indian Easements Act 1882

Section 2 (a), (b), (c) deals with rights of government to regulate the collection, retention, and distribution waters flowing natural rivers and streams; and artificial channels made with government expenses.

Section 2 (b) – recognises the customary rights and easements of individuals and groups but subject to the rights of the government;

Section 17 (d) Prescriptive rights over ground water cannot be acquired over underground water.

Section 18 : An easement may be acquired in virtue of a local custom e-g:allows the multiple use of tanks by different users – herdsmen, fishermen and potters if they had customary right.

2. Code of civil procedures 1908

Section 8 allows any tank user to collectively represent the interests of individual's litigation even though they have no *locus standi* in strict legal terms.

3. Indian Penal code 1860

Offences related to water and tanks finds place in eight sections of the IPC with a maximum punishment of six months.

Section 290: Public nuisance;

Section 291:Continuance of public nuisance;

Section 277 fouling of water;

Section 378 theft;

Section 425 Mischief;

Section 430 Mischief by injury to works of irrigation;

Section 431 Mischief by injury to public road, bridge, canal or rivers;

Section 432 Mischief to public drainage

Annexure 12. List of Cases: High Court and Supreme Court Cases

Agriculturists Associations of (i) Karaipathu, (ii) Maniyappathu, (iii) Melkandam V Government of Tamil Nadu represented by (i) Revenue Secretary, (ii)District collector, (iii) Executive Engineer, PWD, (iv) Palani Municipality. W.P.No.10137 of 1992 In the High Court of Madras.

A.P.Pollution Control Board v M.V.Nayudu, [2001] 2 SCC 62

Alagar Iyengar v State of Tamil Nadu, [2002] 4 LW 498

Anti Corruption Movement v Government of Tamil Nadu, [2008] 1 MLJ 417

Bharath Rathna Dr.B.R.Ambedkar Educational society v Union of India in Madras High Court 19 June, 2002

Boluswamy v Venkadadri Appa Rao, [1919] AIR MAD 506

C. Arulsamy and S. Ubagaram v State of Tamil Nadu, [2003] 4 CTC 670

Chinnappan Chetty v The Secretary of State For India, [1919] 36 MLJ 124

Chitravelu Servai v Samanna Ayyar, 35 IC 108

Coastal Action Network v Tamil Nadu Pollution Control Board, [2005] 1 LW 13

Collector, Tirunelveli v Sudalaipothi Nadar, [1998] (3) MLJ 481

Commissioner of Income Tax v Sevuga Pandiya Thevar, [1932] 63 MLJ 634

Consumer Action Group v Project Director and Member Secretary, In the Madras High Court, W.P. Nos.17915 of 1993 & 25776 of 2006 & M.P. Nos.1 to 4 of 2006 & 1 of 2010

D.Saravanan v Union of India, In the High Court of Madras, W.P.No. 29434 of 2006

Emani Lakshminarasu v the secretary of State, [1918] 43 IC 113 Mad

Intellectuals Forum v State of Andhra Pradesh, [2006] 3 SCC 549

Jagpal Singh v State of Punjab, In Supreme Court of India, [2011] 3 MLJ 760.

K. Balamurugan v The State of Tamil Nadu, In the High Court of Madras. W.P.No.26314 of 2007

K.Subramani v The district collector of Salem, In W.P.No.27523 of 2007

Kandukuri Balasurya Prasadha Rao v The Secretary of State for India [1917] ILR 40 Mad 886

Kandukuri Mahalakshmamma v The Secretary of State for India [1910] ILR 34 Mad 295

L.Krishnan v State of Tamil Nadu [2005] AIR Madras 311

Lachuma Goundan v Pandiyappan [1951] 2 MLJ 658

M.C.Mehta v Union of India, [2002] 4 SCC 356)

M.C.Mehta v. Kamal Nath, [1997] 1 SCC 388

M.K. Janardhanam v The District Collector on 26 July, 2002, In the Madras High Court No.561 of 2001in W.P.No.985 of 2000

Madathapu Ramaya v The Secretary of State, *[1904] ILR 27 (Mad) 386*

Mullaperiyar Environmental Protection Forum v Union of India, [2006] AIR(SC) 1428

Murugaiyah Thevar v The State of Tamil Nadu, Velu Pillai and others. In the Madras High Court S.A.No.s 1225 & 1226 of 1978

Narayanaswami v Kamanna, 51 IC 318

Ponnu Thevar v Arockia Nadar In Madras High Court S.A. Nos. 839 and 1864 of 1981

Ponnusamy v The State of Tamil Nadu, [2005] 4 MLJ 122

Ramnad Big Tank Farmers Association v Government of Tamil Nadu 1996, In the High court of Madras, W.P.No 5389/96

Robert Fischer v Secretary of State [1908], 2 Ind Cas 325

Samayan Servai v Kadir Moideen Rowther, 51 IC 899

S. Gopalan v State of Madras Represented by the Collector, [1958] (71) LW 672

S.V.N.Venkatesan v Government of Tamil Nadu, In the High court of Madras W.P.No. 7243 of 2007 of 2006

S.Venkatesan v Government of Tamil Nadu In the High Court of Madras W.P.No. 19388 of 2006

Sankaravadivelu Pillai v Secretary of State, [1904] 15 MLJ. 32

Secretary of State v Muthuveerama Reddi, [1910] 20 M.L.J. 869

Secretary of State v P.S. Nageswara Ayyar, In the Madras High Court, [1936] AIR Mad 1923

Secretary of state v Subbarayudu, [1931] 55 Mad 268

Secretary of State v Vira Rayan, [*1886] 9 ILR (Mad) 175*

Sivakasi Region Tax Payers Association v The State of Tamil Nadu, In Madras High Court Madurai Bench, W.P.NOs.16636 of 1995 & 22274 of 2007 and M.P.Nos.1 of 2007 & 2 & 3 of 2008.

State of Tamil Nadu v A.Abdul Karim, [1997] 2 MLJ 261

State of Tamil Nadu v P. Krishnamurthy on 24 March 2006, In the Supreme Court of India, Appeal (civil) 5572-5644 of 2005

State of Tamil Nadu v Sudalai Pothinadar, [1998] 2 CTC 718

Sunda Thevar v Collector of Madurai, [1984] 2 MLJ 451

Susetha v Government of Tamil Nadu, [2006] AIR SC 2893

Susetha v The Union of India, [2010] CDJ MHC 4613

T.K. Nallamuthu Pillai. v R.K. Thirumalai Aiyangar, [1942] 1 MLJ 49

T.N. Godavaraman Thirumulpad v Union of India, [2006] 5 SCC 47

T.N.Godavarman Thirumulpad v Union of India, *[2006] 1 SCC 1*

T.S.Senthil Kumar v Government of Tamil Nadu, [2010] Writ Law Reporter 113.

Uppliyanthittu Kamarajar Nagar Residents Welfare Association v District collector, Dindigul and Palani Vaiyapuri Kalvai Pasana Karaipathu Puravu Farmer's Association, In Writ Petition No.7440 and 7552 of 2009 and Contempt Petition No.302 of 2009.

Vellore citizens' welfare forum v Union of India, *[1996] 5 SCC 647*

Ongoing Cases

M.Kesavan v Cumbum Valley Distributary Committee and Others 2010; *Old Vaigai Ayacutdars Association of Ramnad, Sivagangai, and Madurai District v Cumbum Valley Distributary Committee and Others* 2010; *Poorviga Vaigai Pasana Vivasayigal Koottamaippu v Cumbum Valley Distributary Committee and Others* 2010; *Cumbum Valley Distributary CommitteeV State of Tamil Nadu and Others* 2010; *Periyar System Project Committee v State of Tamil Nadu and Others* 2010. In the High Court of Madras at Madurai W.P.No. 7055 and 7056 of 2010.

ANNEXURE 13. OBJECTIONS TO VAIGAI RESERVOIR SCHEME FROM THE RYOTS OF RAMNAD DISTRICT - TRANSLATED EXCERPTS FROM PETITION TO GOVERNMENT (FEB 1950)

1. ***Water quality:*** The proposed reservoir will possibly arrest the flow in the river and store the water for some time causing the silt & nutrients to settle at the dam site. This would reduce the nutrient quality of the water and reduce the crop yield by 25 %.
2. ***Merit of investment:*** A huge investment of Rs 20 Million for the project is expected to result in bringing an additional area of a mere 11,000 *ac*. If proper schemes are drawn for Ramnad district, (repairing the tanks/forming bed dams across Vaigai) even an amount of Rs 0.06 Million would result in substantial returns.
3. ***Poor returns:*** The proposed reservoir is expected to yield 1 % return on investment (ROI) for a hundred years life cycle of the dam. If the same amount is invested in constructing bed regulators in lower down reaches that might yield a ROI of not less than 4 %. It is irresponsible to spend public resources that yield such poor returns in these difficult times.
4. ***Benefitting backward areas:*** The proposed beneficiary, Thirumangalam Taluk is certainly a backward area. However, in terms of all comparable measures, Mudhukulathur and Thiruppachethi blocks in Ramnad are even more backward or worse off and should be included on priority.
5. ***Regional benefit from Vaigai:*** Even though the river Vaigai flows in Madurai and Ramnad districts, the former benefits more. Madurai has got Periyar *ayacut* of 140,000 *ac* and vast stretches of Cumbum valley (around 13,000 *ac*). At the same time Ramnad has got only 114,000 *ac*, and that too the traditional tanks.
6. ***Submergence:*** The reservoirs will submerge huge areas under water, thereby losing substantial area from any use, but if alternate methods are adopted in Ramnad there won’t be loss of any land at all.
7. ***Accounting for Vaigai water:*** It is impractical to keep account of water from Vaigai catchments and Periyar flows separately. Releasing Vaigai

flows will not be practicable and technically realizable from the reservoir if stored. Response of the Engineers who had drafted the scheme is not convincing and remains eyewash.

8. ***Surplus in Vaigai:*** We do not agree that there is some surplus in Vaigai River which flows into the sea. There are no records or data with anyone regarding such a claim.
9. ***Previous judgement:*** As per the High Court judgement of 1908 on Fischer's suit, 1750 cusecs of water need to be released in Periyar main canal for 52 days to benefit 11,000 *ac*. This is too much of water for the area. This has been accepted by the court as a correct proposition in those times (colonial times) and no engineer worth his salt will accept this ruling. However, the judgement at least prohibited any new area to be added to Periyar irrigation. We request the government not to take away our water to new areas using the judgement.
10. ***Flows in Vaigai:*** Even though the government has no right to allocate all the water for Periyar irrigation, the current practice is that all the water is diverted away at Peranai regulator. The so called telegraphic regulation is highly improper. Water in Vaigai flows only during November and December for a few days in a year and at all other times the river runs dry.
11. ***Alternate storages through tanks:*** The new reservoir at a cost of Rs 20 Million is expected to store water released from hydroelectric station during the periods between January and May. Such a balancing storage if needed, can easily be achieved by strengthening the existing four large tanks in Sivaganga for a fraction of the cost.
12. We request the government to ***consider our proposals*** and suggestions carefully and plan for the development of Manamadurai, Thiruppuvanam, and Paramakudi areas.

(Ryots of Ramnad 1950)

ANNEXURE 14. LIST OF CASES: LOWER COURT CASES

Ganesan, President of Piramanur Channel irrigators Association v The District collector, O.S.No.18/2004, In the Additional District Munsif Court Manamadurai

K.A.Karuppiah Thevar v Raju, O.S.No. 408/1969. In the Court of the Principal District Munsif, Manamadurai, Ramanathapuram district.

Krishnammal v The Planning Coordinator, Sarvashiksa Abhiyan, Virudhunagar; *and the District collector*, Virudhunagar, O.s.No. 362/2004 In the court of the District Civil Judge, Sivakasi.

P.Ramachandran and others V R.Ganesan and others, O.S.No. 113/2001, In the Additional District Munsif Court, Manamadurai

Shanmugavel v District collector, O.S.No. 37/2003, In the District Munsif Court, Aruppukottai.

Theyvanai Ammal v Chappani, O.S.No. 51/2002, In the Additional District Civil and Judicial Court , Manamadurai

U.Krishnan v V.Sakthivel Pillai and District Collector, O.S.no. 81/2002, In the Additional district civil and judicial court , Manamadurai.

U.S.Ramadoss v District collector Madurai; Panchayat Union, T.Kalluppatti; and Vaiyur Panchayat, O.S.No. 549.1977, In the court of the Sub-judge of Madurai.

BIBLIOGRAPHY

Abeyratne, S. 1990. *Rehabilitation of Small-Scale Irrigation Systems in Sri Lanka State Policy and Practice in Two Systems*. Country Paper No.6. Colombo: IIMI.

Adas, Michael. 1989. *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*. First. Ithaca: Cornell University Press.

Agarwal, Anil, and Sunita Narain. 1990. *Village Ecosystem Planning*. Vol. 16. IIED, International Institute for Environment and Development.

———. 1997. *Dying Wisdom: Rise, Fall and Potential of India’s Traditional Water Harvesting Systems*. Vol. 4th Citizen's Report on the State of India's Environment. New Delhi: Centre for Science and Environment.

Agrawal, Arun, and K. Sivaramakrishnan. 2000. *Agrarian Environments: Resources, Representations, and Rule in India*. Durham N.C.: Duke University Press.

Aiyar, Mani Shankar. 2002. “Panchayati Raj: The Way Forward.” *Economic and Political Weekly* 37 (31): 3293–97.

Alavi, Seema, ed. 2002. *The Eighteenth Century in India*. Delhi: Oxford: Oxford University Press.

Ambler, John. 1994. “Financial and Institutional Challenges for Tank Sustainability: Some Historical Lessons.” In , 52–59. Director of Rural Development and PRADAN.

Anna University, ed. 1982. “Proceedings of the International Workshop on Modernisation of Tank Irrigation System - Problems and Issues.” In Madras: Anna University.

Anon. 1997. “ராமநாதபுரம் மாவட்ட விவசாயத்திற்கு இன்று தண்ணீர் திறப்பு: மதுரை மாவட்ட விவசாயிகள் அச்சம் (Vaigai Waters Released to Ramnad: Farmers in Madurai District are Apprehensive).” *Dinamalar*, January 29, Madurai edition, sec. General.

Arbuthnot, Alexander J. 1889. *Major-General Sir Thomas Munro, Governor of Madrus: A Memoir*. Kegen Paul, Trench. http://archive.org/details/majorgeneralsir00arbugoog.

Mackenzie, Archibald Thomas. 1899. *History of the Periyar Project Compiled by A T Mackenzie [With Plans]*. Madras: Superintendent of Government Press.

Arul, Carolin. 2005. *Water Laws and Rights in India*. Delhi: Indian Society for Promoting Christian Knowledge and United Evangelical Lutheran Church in India, Chennai.

Dhawan, B.D. 1999. *Studies in Indian Irrigation*. New Delhi: Commonwealth Publishers.

Baden-Powell, B. H. 1892. *The Land-Systems of British India: Being a Manual of the Land-Tenures and of the Systems of Land-Revenue Administration Prevalent in the Several Provinces*. Oxford: Clarendon.

Bagchi, Amiya. 2010. *Colonialism and Indian Economy*. New Delhi: Oxford University Press.

Baker, Christopher John. 1984. *An Indian Rural Economy 1880-1955: The Tamilnad Countryside*. Oxford: Clarendon.

Baker, Christopher John, and D. A. Washbrook. 1975. *South India: Political Institutions and Political Change, 1880-1940*. Delhi: Macmillan.

Baliga, BS. 1960. *Studies in Madras Administration. First Edn. Madras: Government of Madras.* first. Vol. 1. 2 vols. Madras: Government of Madras.

Bardhan, Pranabh. 1989. “Alternative Approaches to the Theory of Institutions in Economic Development.” In *The Economic Theory of Agrarian Institutions*, edited by Pranabh Bardhan, First, 1– 17. Oxford: Clarendon.

———. 1993. “Analytics of the Institutions of Informal Cooperation in Rural Development” 21 (4): 633–39.

Baumann, Pari, and John Farrington. 2003. *Decentralising Natural Resource Management: Lessons from Local Government Reform in India*. 86. London: Overseas Development Institute (ODI).

Bennett, John William. 1998. *Classic Anthropology: Critical Essays, 1944-1996*. Transaction Publishers.

Besant, Annie. 1918. *The Indian Government*. Home Rule Series 20. Madras: The Commoonweal Office adyar.

Bijker, Wiebe E. 2007. “Dikes and Dams, Thick with Politics.” *Isis* 98 (1): 109–23.

Board of Revenue, Madras Presidency. 1851. *The Circular Orders of the Board of Revenue, from A.D. 1820 to 1850 Inclusive; with Notes and References. Compiled by John Maskell.* Madras: Government of Madras.

———. 1866. *The Standing Orders of the Board of Revenue from 1820 to 1865/ Re-Arranged and Abridged by R.A. Dalyell.* Madras: Government of Madras.

———. 1920. *Standing Orders of the Board: Land Revenue, Settlement and Miscellaneous: Revised up to 30th June 1919.* Vol. 1. Madras: Superintendent of Government Press.

Boyce, James K. 1988. "Technological and Institutional Alternatives in Asian Rice Irrigation." *Economical and Political Weekly* 23 (13): A6–A22.

Brewer, J. D., S Kolavalli, , Kalro, A. H., Naik, S Ramnarayan, K. V. Raju, and R. Sakthivadivel. 1999. *Irrigation Management Transfer in India: Policies, Processes and Performance.* New Delhi: Oxford & IBH.

Briggs, John. 1830. *The Present Land-Tax in India Considered as a Measure of Finance, in Order to Show Its Effects on the Government and the People of That Country, and on the Commerce of Great Britain: In Three Parts*. London: LONGMAN, REES, ORBIE, BROWN, AND GREEN, PATERNOSTER ROW. http://www.jstor.org/stable/60209777.

Bromley, Daniel W., and Michael M. Cernea. 1996. *The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies*. World Bank Publications.

Bruns, Bryan Randolph, and Ruth Suseela Meinzen-Dick, eds. 2000. "Water Rights and Legal Pluralism: Some Basics of a Legal Anthropological Approach." In *Negotiating Water Rights*, 162–99. New Delhi: Vistaar.

Central Water Commission. 1986. *Four Decades of Central Water Commission in the Service of the Nation*. New Delhi: Central Water Commission.

CGWB. 2008. *District Ground Water Brochure - Theni District Tamil Nadu*. Technical Report Series. Chennai: Central Ground Water Board. http://cgwb.gov.in/District_Profile/TamilNadu/THENI.pdf.

Chambers, Robert. 1988. *Managing Canal Irrigation: Practical Analysis from South Asia*. Cambridge [England]; New York: Cambridge University Press.

Chandramurthi, M., and V. Vedachalam. 2002. *Parakkiramapandiapuram*. Chennai: Kalaithai Pathippagam.

Chandrasekaran, A. 2002. *Land Laws of Tamil Nadu*. Second. Chennai: C.Sitaraman & Co.

Chauhan, B.R. 1992. *Settlement of International and Inter-State Water Disputes*. Indian Water Law Series. Delhi: Indian Law Institute.

Chief Engineer, (Irrigation). 1984. “Manjalar Reservoir, Manjalar Sub Basin, Vaigai Basin. Basin no.20.5.” In *Compendium of Rules of Regulation Part I - Rules for Water Regulation*, 1:219. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

Chief Engineer Madurai Region. 2006a. “Periyar Vaigai System-Water Regulation Rules for Periyar Credit and Vaigai Credit at Vaigai Dam-Changes/modifications”. WRO-PWD, Madurai.

———. 2006b. “Periyar Vaigai System-Water Regulation Rules for Periyar Credit and Vaigai Credit at Vaigai Dam- Changes/modifications”. WRO-PWD, Madurai.

Chief Engineer, (Irrigation). 1984a. “Periyar-Vaigai System: Vaigai Basin.” In *Compendium of Rules of Regulation Part I - Rules for Water Regulation*, 203–17. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

———. 1984b. “Marudhanathi Reservoir.” In *Compendium of Rules of Regulation Part I - Rules for Water Regulation*, 223. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

———. 1984c. “Sathiar Odai Reservoir.” In *Compendium of Rules of Regulation Part I - Rules for Water Regulation*, 227. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

———. 1984d. “Varadhamanadhi Reservoir in Amaravathy Sub Basin, Cauvery Basin. Basin No. 12-13-2-2.” In *Compendium of Rules of Regulation Part I - Rules for Water Regulation*, 171–81. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

Chief Engineer, (Irrigation). 1984e. *Compendium of Rules of Regulation Part I - Rules for Water Regulation*. Madras: Office of the Chief Engineer (Irrigation). P.W.D.

Chief Engineer, Madurai Region. 2009. “Impounding Water at Vaigai Dam-Calculating Vaigai Credit and Periyar Credit - Procedure to Be Followed - Views of the Beneficiaries”, September 14.

Chow, Ven Te, David R. Maidment, and Larry W. Mays. 1988. *Applied Hydrology*. McGraw-Hill Series in Water Resources and Environmental Engineering. New York: McGraw-Hill.

Clothey, Fred W. 1972. “Pilgrimage Centers in the Tamil Cultus of Murukan.” *Journal of the American Academy of Religion* 40 (1): 79–95.

Cohn, Bernard S. 1990. *An Anthropologist among the Historians and Other Essays*. 2nd. impression, with corr. Delhi ; Oxford: Oxford University Press.

———. 1996. *Colonialism and Its Forms of Knowledge: The British in India*. Princeton Studies in Culture/power/history. Princeton, N.J: Princeton University Press.

Madras Government, 1854. *Collective Memorandum on Public Works in the Madras Presidency.* 1854. Selections from the Records of the Madras Government ; no.5. Madras: Fort St.George Gazette Press.

Commission, India. Irrigation, Ajit Prasad Jain, and National Atlas Organisation (India). 1972. *Report of the Irrigation Commission*. Ministry of Irrigation and Power.

Cotton, Elizabeth Reid. 1900. *General Sir Arthur Cotton, R.E., K.C.S.I., His Life and Work. By His Daughter Lady Hope. With Some Famine Prevention Studies by William Digby ... Portraits, Maps and Illustrations.* London: Hodder & Stoughton. http://ia351437.us.archive.org/3/items/generalsirarthu01digbgoog/generalsirarthu01digbgoog.pdf.

Cotton, Frederic C. 1901. *A Letter and Two Other Papers on the Water of the Great Rivers of India - an Essential to the Prosperity of the Nation and the Only Possible Means of Preventing Famine. after Seventy Three Years' Study of the Subject.* London: Rivingtons.

Coward, E. Walter. 1980. *Irrigation and Agricultural Development in Asia: Perspectives from the Social Sciences*. Ithaca ; London: Cornell University Press.

Cox, Arthur Frederick. 1895. *A Manual of the North Arcot District in the Presidency of Madras.* [Another New edition revised by Harold A. Stuart. Madras District Manuals. Madras.

Cullet, Philippe. 2009. *Water Law, Poverty, and Development: Water Sector Reforms in India*. New York: Oxford University Press.

———. 2010. “Water Sector Reforms and Courts in India Lessons from the Evolving Case Law.” *Review of European Community & International Environmental Law* 19 (3): 328–38.

Cullet, Philippe, and Sujith Koonan. 2011. *Water Law in India: An Introduction to Legal Instruments*. New Delhi: Oxford University Press.

Cullet, Philippe, Suhas Paranjape, Himanshu Thakkar, and M. S. Vani. 2012. “Water Conflicts in India – Towards a New Legal and Institutional Framework”. Monographs. http://eprints.soas.ac.uk/13547/.

CWR. 1992. *Tank Modernisation (Phase I) with EEC Assistance: Monitoring And Evaluation Final Report*. Chennai: CWR, Anna University.

———. 1993. *Proceeding of the THINK TANK - Seminar*. Conference Proceedings. Chennai: Anna University.

———. 2003. *Tamil Nadu Water Resources Consolidation Project- Post Project Evaluation of Irrigation Commands.* Evaluation report. Chennai: CWR, Anna University.

CWR, and Ford Foundation. 2001. *Alternative Approaches to Tank Rehabilitation and Management- an Experiment: Lessons Learnt*. Chennai: CWR, Anna University.

D’Souza, Radha. 2002. “At the Confluence of Law and Geography: Contextualising Inter-State Water Disputes in India.” *Geoforum* 33 (2): 255–69. doi:10.1016/S0016-7185(01)00031-8.

———. 2005. “Colonial Law And The Tungabhadra Disputes: Lifting The Veil Over The Agreement of 1892.” *Natural Resources Journal* 45 (2): 311–344.

———. 2006. *Interstate Disputes over Krishna Waters: Law, Science and Imperialism*. Hyderabad: Orient Longman.

D’Souza, Rohan. 2006. “Water in British India: The Making of a ‘Colonial Hydrology’.” *History Compass* 4 (4): 621–28.

Demsetz, Harold. 1967. "Towards a Theory of Property Rights." *American Economic Review* 57 (2): 347–59.

Dhan Foundation. 2012. *Evolving Policies for Integrated Water Resources Management for Cities - Case Studies of Chennai and Madurai Prepared for the GoI- Ministry of Urban Development*. Assessment report. Madurai: DHAN Foundation.

DHAN Foundation. 2001. "Rehabilitation of Oorani (Ponds) for Providing Drinking Water in Drought Prone Ramanathapuram District of Tamilnadu." *Tank Cascade* 3 (1&2): 1–4.

———. 2002a. *Co-Management of Tank Systems: A Study on Various Conflicts of Water and Water Use in Gundar River Basin*. Madurai: DHAN Foundation.

———. 2002b. "Revisiting Village Tanks of India: Seminar Papers and Proceedings of the National Policy Seminar." In Vol. New Delhi. Madurai: DHAN Foundation.

———. 2009. "Indian Laws and Acts on Traditional Irrigation Systems." In *Water and Laws in India*, First:477–510. New Delhi: SAGE.

Dharampal. 1972. *The Madras Panchayat Systems*. Vol. Vol 2. Delhi: Impex India.

———. 2000a. *Dharampal's Collected Writings: Panchayat Raj and India's Polity*. Vol. 4. 5 vols. Goa: Other India Press.

———. 2000b. *Dharampal's Collected Writings: Essays on Tradition, Recovery and Freedom*. First. Vol. v. v vols. Goa: Other India Press.

Dharvesh Maideen, M. 2010. "அரசு ஆணை எண் :122 நாள் 21.04.2010 ஐ ரத்துச் செய்து பழைய அரசாணை எண் 1689/PWD நாள் 22.11.1974 ஐ மீண்டும் அமல்படுத்த வேண்டி விண்ணப்பம் (Petition to withdraw G.O No.122 dated 21.04.2010 and bring back G.O 1689/PWD dated 22.11.1974- Request)". Federation of Water Users Association in Cumbum valley.

Dirks, Nicholas B. 1986. "From Little King to Landlord: Property, Law, and the Gift under the Madras Permanent Settlement." *Comparative Studies in Society and History* 28 (2): 307–33.

———. 1993. *The Hollow Crown: Ethnohistory of an Indian Kingdom*. 2nd ed. Ann Arbor, MI: University of Michigan Press.

District Collector, Madurai. 1950. *Collector’s Report on the Vaigai Reservoir Scheme Dated 11.4.50*. Madurai: District collectorate.

District Collector, Ramanathapuram. Proceedings of the meetings. 1950. “District Food Committee Meetings, Ramanathapuram District, May 1950”, January 26.

Ellis, W.M. 1963. *Irrigation Manual*. Madras: College of Engineering.

Executive Engineer PWD. 1986. *Tank Restoration Survey (TRS) Memoirs and Statistics of Shanmuganathi Minor Basin of the Amaravathi River Basin*. Technical. Madurai: Public Works Department - Tank Restoration Division.

Falkenmark, Malin, and Carl Gusta Widstrand. 1980. *Water and Society: Conflicts in Development*. Vol. 8. Oxford ; New York: Pergamon Press.

Feenberg, Andrew. 2010. “Ten Paradoxes of Technology.” *Techne* 14:1 (Winter 2010). http://www.sfu.ca/~andrewf/paradoxes.pdf.

Francis, W. 1906. *Masras District Gazetteers: Madura*. First. Vol. 1. Madras: Superintendent of Government Press. http://ia600300.us.archive.org/8/items/madurafrancis01madr/madurafrancis01madr.pdf.

Fukuda, Hitoshi. 1976. *Irrigation in the World: Comparative Developments*. Tokyo: University of Tokyo Press.

Gandhi, M. K. 1984. *Hind Swaraj or Indian Home Rule*. Rev. new ed. Ahmedabad: Navajivan.

Geertz, Clifford. 1972. “The Wet and the Dry: Traditional Irrigation in Bali and Morocco.” *Human Ecology* 1 (1): 23–39.

———. 2008. *Local Knowledge: Further Essays in Interpretive Anthropology*. Third. New york: Basic Books.

Gilmartin, David. 1994. “Scientific Empire and Imperial Science: Colonialism and Irrigation Technology in the Indus Basin.” *The Journal of Asian Studies* 53 (4): 1127–49. doi:10.2307/2059236.

Gomathinayagam, P, and J.D Sophia. 2003. *“Oppadis”- Traditional Irrigation Societies in Tamiravaruni System*. Madurai: DHAN Foundation.

Government of Madras. 1977. *Standing Orders of the Board of Revenue: Land Revenue, Settlement, and Miscellaneous*. Madras: Director of Stationery and Printing on behalf of the Government of Tamil Nadu.

Government of Tamil Nadu. 2007a. *Season and Crop Report 2006-2007*. Statistical report. Chennai: Government of Tamil Nadu.

———. 2007b. *Revenue Standing Orders (Land Revenue, Settlement, and Miscellaneous) - in Four Volumes Compiled by M.Ajmal Khan, M.Gnana Gurunathan, A.P.Ramasamy, ATC.Radha Krishnan*. First. 4 vols. Madurai: Account Test Centre.

———. 2012. *Microlevel Reappraisal Study of Vaigai Basin*. Environmental reappraisal. Madurai.

Government of Tamil Nadu, Tamil. 2003. *STATE FRAME WORK WATER RESOURCES PLAN*. Chennai: Institute of Water Resources.

Gowri, K. 1987. *Madurai under the English East India Company, 1801-1857*. Madurai: Raj Publishers.

Guha, Ranajit. 1963. *A Rule of Property for Bengal: An Essay on the Idea of Permanent Settlement*. Le Monde D'outre-Mer, Passé et Présent 19. Paris: Mouton.

Guhan, S. 1993. *The Cauvery River Dispute: Towards Concilation*. Madras: Frontline.

Guillet, David. 2006. "Rethinking Irrigation Efficiency: Chain Irrigation in Northwesten Spain." *Human* 34 (3): 305–31.

Gulati, Ashok, Ruth Meinzen-Dick, and K. V. Raju. 2005. *Institutional Reforms in Indian Irrigation*. New Delhi: SAGE.

Gulati, N.D. 1965. *Administration and Financing of Irrigation Works in India*. New Delhi: CBIP Publication No. 77.

Gunawardana, R. A. L. H. 1971. "Irrigation and Hydraulic Society in Early Medieval Ceylon." *Past & Present*, no. 53 (November): 3–27.

Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* 162: 1243–48.

Hussein, Basheer. 1972. *The Cauvery Water Dispute*. Mysore: Rao and Raghavan.

IIMI Studies. 1994. *IIMI-SLFO Guidance Package for Water Development of Small Tank Cascade Systems*. Colombo: IIMI.

India. Irrigation Commission., and Colin Campbell Scott-Moncrieff. 1903. *Report of the Indian Irrigation Commission, 1901-1903*. Cd. (Great Britain. Parliament). Calcutta London: Office of the Supt. of Govt. Printing; Printed for H.M.S.O by Darling & Son.

Institute of Water studies. 1988. *Water Resources Assessment of Vaigai Basin*. Water Assessment IWS report no. 1/1988. Madras: Institute of Water studies.

IUCN. 2005. *Multiple Benefits of Small Irrigation Tanks and Their Economic Value a Case Study in the Kala Oya Basin, Sri Lanka*. Occasional paper No 7. Colombo: IUCN, Sri Lanka.

Iyengar, Sundararaja S. 1933. *Land Tenures in the Madras Presidency*. First. Madras: Royal Printing Works.

Iyer, C.P.R. 1917. *Cooperation and Panchayats with Other Reforms The Presidential Address Delivered at the Second Malabar, District Conference*. Home Rule Series 22. Madras: The Commoonweal Office Adayar.

Iyer, Ramanatha. 1968. *South Indian Inscriptions (S.I.I)- Pandiya Inscriptions*. Vol. XIV. New Delhi: Archaeological survey of India.

Iyer, Ramaswamy. 1994. "Indian Federalism and Water Resources." *International Journal of Water Resources Development* 10 (2): 191–202.

———. 2007. "Towards Good Sense on Mullapperiyar." *Economic and Political Weekly* 42 (1): 13–15.

———. 2011. "Mullaperiyar: A Plea for Sanity." *Economic and Political Weekly* XLVI (51): 12–13.

Iyer, Ramaswamy R, ed. 2009a. "Legal Aspects of Water Resource Management." In *Water and the Laws in India*. New Delhi: Sage.

———. 2009b. *Water and the Laws in India*. New Delhi: Sage.

Janakarajan, S. 1989. *Characteristics and Functioning of Traditional Irrigation Institutions*. Vol. XIX. Chennai: MIDS.

———. 1993. "In Search of Tanks Some Hidden Facts." *Economic and Political Weekly* 28 (26): A–53.

Janakarajan, S., and A. Vaidyanathan. 1997. *Conditions and Characteristics of Ground Water Irrigation: A Study of Vaigai Basin in Tamil Nadu*. A report of the research project supported by the Planning Commission, Govt. of India. Chennai: Madras Institute of Development studies.

Janardhanan Nair, K. 1997. “Injustice to the Extension Areas.” In *State Level Seminar*. Trichirappalli: Irrigation Management Training Institute (IMTI).

Joy, K.J., Suhas Paranjape, Biksham Gujja, Vinod Goud, and Shruti Vispute. 2009. *Water Conflicts in India: A Million Revolts in the Making*. New Delhi: Routledge India.

Kadankar, Mohan S, and Aniruddhe Mukherjee. 2013. *Bhoj Wetland: Experience and Lessons Learned Brief*. Scientific Report. Bhopal. Accessed June 19. http://www.worldlakes.org/uploads/04_Bhoj_Wetland_27February2006.pdf.

Karuppusamy, N., and R. Seenivasan. 2001. “Lessons from a Pilot Project on Farmer Led Tank Irrigation System Development in a Cascade of Tanks through GO-NGO.” *Tank Cascade* 2 (1&2): 1–32.

Kathiresan, Durai. 1997. “வைகை நதியும் பூர்வீக பாசனமும் (River Vaigai and its traditional irrigation)”. Handwritten brochure.

———. 1998. “பூர்வீக வைகை நதியும் பாசனமும் (Traditional Vaigai River and its irrigation)”. Handwritten brochure.

Keller, Andrew, R. Sakthivadivel, and David Seckler. 2000. *Water Scarcity and the Role of Storage in Development*. 39. Colombo: IWMI.

Khaldun, Talmiz. 2007. “The Great Rebellion.” In *Rebellion 1857*, edited by P.C Joshi, First reprint. Popular Social Science. New Delhi: National Book Trust of India.

Krishnamoorthy, S. 2004. *Tamilnadu Water Resources Consolidation Project: Micro Level Environmental Status Report for Vaigai River Basin*. Madurai: WRO-PWD.

Krishnan, A. 1998. *Literature and Epigraphy of Tamilnadu*. Delhi, India: Bhartiya Kala Prakashan.

Krishnaswamy, S.Y. 1947. *Rural Problems in Madras*. Madras: Government Press.

Kumarappa, J. C. 1945. *Public Finance and Our Poverty: The Contribution of Public Finance to the Present Economic State of India*. First. Ahmedabad: Navajivan Press.

Kumarappa, J. C. 1931. *A Survey of Matar Taluka (Kaira District)*. First. Economic Series. Ahmedabad: Gujarat Vidyapeeth.

Leach, E. R. 1959. “Hydraulic Society in Ceylon.” *Past & Present* 15 (1): 2–26. doi:10.1093/past/15.1.2.

Leach, E. R. 1961. *Pul Eliya: A Village in Ceylon: A Study of Land Tenure and Kinship*. Cambridge: Cambridge University Press.

Ludden, David. 1999. *An Agrarian History of South Asia*. Vol. 4.4. Cambridge: Cambridge University Press.

Maass, Arthur. 1978. *- and the Desert Shall Rejoice: Conflict, Growth and Justice in Arid Environments*. Cambridge, Mass: M.I.T. Press.

MacDonald, J. R. 1910. *The Awakening of India*. London: Hodder and Stoughton.

Maclean, C. D. 1987. *Maclean’s Manual of the Administration of the Madras Presidency: Glossary of the Madras Presidency, Containing a Classification of Terminology, a Gazetteer and Economic Dictionary of the Province and Other Information, the Whole Arranged Alphabetically and Indexed.* Second. Madras: Asian Educational Service.

Madras Assembly Secretariat. *Proceedings of the First Madras Assembly (1952-57)*. Vol. unknown. Madras: Government of Madras.

Maloney, Clarence, and K. V. Raju. 1994. *Managing Irrigation Together: Practice and Policy in India*. New Delhi; Thousand Oaks, CA: Sage.

Manfred A., Max-Neef. 2005. “Foundations of Transdisciplinarity Chris Tanner, Frank Kessel, ” *Ecological Economics*, no. 53: 5–16.

Markham, C. R. 1866. “On the Effects of the Destruction of Forests in the Western Ghauts of India on the Water-Supply.” *Journal of the Royal Geographical Society of London* 36 (January): 180–95. doi:10.2307/1798498.

Mathew, George. 2000. *Status of Panchayati Raj in the States and Union Territories of India*. Delhi: Concept Publishers and Institute of Social Sciences.

Matsui, Kenichi. 2005. "'White Man Has No Right to Take Any of It': Secwepmec Water Rights Struggles in British Columbia." *Wicazo Sa Review* 20 (2, Twentieth Anniversary commemorative Issue): 75–101.

Mendelsohn, Oliver. 1981. "The Pathology of the Indian Legal System." *Modern Asian Studies* 15: 823–63.

Menon, Madhava, N.R, S Chockalingam, and Lata Krishnamurthy. 1984. "Judicial Organisation and Administration in Tamil Nadu." In *The Legal Profession: A Preliminary Study of the Tamil Nadu Bar*, Edited by Madhava Menon N.R, First, 262. New Delhi: Bar council of India Trust.

MIDS. 1986. *Tank Irrigation in Tamil Nadu: Some Macro and Micro Perspectives*. Madras: Madras Institute of Development Studies.

Millennium Ecosystem Assessment. 2005. Synthesis report. Washington, D.C.: Island Press.

Miller, Russell A, and Peer C Zumbansen, eds. 2011. "Special Issue: Many Fates of Legal Positivism." *German Law Journal* 12 (2): 599–826.

Mohanakrishnan, A. 1997. *History of Periar Dam with Century Long Performance.* New Delhi: Central Board of Irrigation and Power.

———. 2012. "116-Year-Old Mullaperiyar Dam Is as Good as New." Accessed January 1. http://www.thehindu.com/news/states/article2764198.ece?homepage=true.

———. Government correspondence. 2009. "Advisory Note to the Government on the- 'Petition from the Old Vaigai Ayacutdhars Association Addressed to the Hon'ble Chief Minister of Tamil Nadu- Discussion with Ayacutdhars'- Consideration of Certain Issues in the Petition -", December 1.

Moncrieff, Colin Campbell Scott. 1868. *Irrigation in Southern Europe: Being the Report of Tour of Inspection of the Irrigation Works of France, Spain, and Italy, Undertaken in 1867-68 For the Government of India.* London: E&F.N.Spon.

Morgan, F.E. 2004. *Southern India: Its History, People, Commerce, and Industrial Resources*. Edited by Arnold Wright and J. W. Bond. Second. New Delhi: Asian Educational Services.

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.

———. 1999. “Colonial and Contemporary Ideologies of Community Management: The Case of Tank Irrigation Development in South India, ” *Modern Asian Studies* 33: 303–38.

———. 2003. *The Rule of Water: Statecraft, Ecology and Collective Action in South India*. New Delhi and Oxford: Oxford University Press.

———. 2006. “Rule and Representation: Transformations in the Governance of the Water Commons in British South India.” *The Journal of Asian Studies,* 65 (1): 61–90.

Mukherjee, Nilmani. 1962. *The Ryotwari System in Madras 1792-1827*. Calcutta: Firma K.L.Mukhopadhyay.

Mukundan, T.M. 1988. “Ery Systems of South India.” *PPST Bulletin*, no. 16: 1–33.

Munro, Thomas. 1881. *Major-General Sir Thomas Munro, Governor of Madras: Selections from His ...* Kegan Paul. http://archive.org/details/majorgeneralsir01arbugoog.

Myrdal, Jan. 1984. *India Waits*. Madras: Sangam Books.

Nagaswamy, R. 1971. *Studies in Ancient Tamil Law and Society*. first. Chennai: Department of Archaeology, Government of Tamil Nadu.

Narambunatha Pillai, MKN. 1950. “Vaigai Reservoir Scheme- Areas Affected in Ramnad District”, February 14.

Narayanan, E.V. 1950a. “Response to Note Received from the District Collector of Madurai - Vaigai Reservoir Scheme”, February 17.

———. 1950b. “Discussion of Vaigai Reservoir Project”, February 24.

Narayanan, E.V, and S Kumaraswamy. 1952. *Preparing Working Tables for Periyar Lake and the Proposed Vaigai Reservoir so as to Suit the Requirements of Irrigation and Power Development to the Maximum Advantage with Utmost Economy.* Proceedings. Thekkadi: superintending engineer, PWD and Executive Engineer Hydro electric surveys.

Natarajan, A. 1997. *Soil Resources of Tamil Nadu for Land-Use Planning*. Nagpur: National Bureau of Soil Survey & Land Use Planning, Indian Council of

Agricultural Research in co-operation with Dept. of Agriculture, Chennai, Soil Survey and Land Use Organisation, Coimbatore.

Nelson, J. H. 1868. *The Madura Country*. Madras: Printed at the Asylum Press.

Nilakanta Sastri, K. A. 1966. *A History of South India from Prehistoric Times to the Fall of Vijayanagar*. Third Edition. London: Oxford University Press.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge and New York: Cambridge University Press.

———. 1992. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco, Calif.; Lanham, Md.: ICS Press; Distributed to the trade by National Book Network.

———. 2007. “A Diagnostic Approach for Going beyond Panaceas.” *Proceedings of the National Academy of Sciences* 104 (39): 15181–87.

———. 2009. “A General Framework for Analyzing Sustainability of Social-Ecological Systems.” *Science* 325 (5939): 419–22.

Pahuja, Sundhya. 2007. “Beheading the Hydra: Legal Positivism and Development.” *Law, Social Justice & Global Development*, no. 1. http://go.warwick.ac.uk/elj/lgd/2007-1/pahuja.

Palani Municipality. 2008. *City Corporate Cum Business Plan*. Business Plan. Palani: Palani Municipality.

Palanisami, K. 2006. “Sustainable Management of Tank Irrigation Systems.” *Journal of Developments in Sustainable Agriculture* 1: 34–40.

Palanisami, K., and R. Balasubramanian. 1995. “Resource Mobilisation and Tanks Performance under Panchayat and PWD Management in Tamil Nadu.” In *National Workshop on Traditional Water Management for Tanks and Ponds*. Vol. Madras. Madras: CWR, Anna University.

Palanisami, K., and William Easter. 1983. *The Tanks of South India: A Potential for Future Expansion in Irrigation*. St.Pauls USA: University of Minnesota.

Palanisami, K., Muniyandi Jegadeesan, Koichi Fujita, and Yasuyuki Kono. 2008. *Impacts of the Tank Modernization Programme on Tank Performance in Tamil Nadu State, India*. 5. Kyoto Working Papers on Area Studies. Kyoto: Centre for South East Asian Studies, Kyoto University.

Palanisami, K., and Ruth Mainzen-Dick. 2001. "Tank Performances and Multiple Uses in Tamil Nadu, South India." *Journal of Irrigation and Drainage Systems* 15: 173–95.

Palanisami, K., N. Murali, and M. Ali. 1994. *Tank System Performance*. Coimbatore: Water Technology Centre, TNAU.

Palanithurai, G., K. Vallinayagam, N. S. Chidambaram, and K. Subramaniam. 2007. *A Hand Book For Panchayati Raj Administration -Tamil Nadu*. Vol. First. New Delhi: Concept.

Panabokke, C.R, R. Sakthivadivel, and Ashoka Das Weerasinghae. 2002. "Evolution, Present Status and Issues Concerning Small Tank Systems in Sri Lanka." In *Village Tanks of South Asia*, 26–82. Madurai: DHAN Foundation. http://publications.iwmi.org/pdf/H036586.pdf.

Paranjape, Suhas, K. J. Joy, S Manasi, N Latha, and Peter Mollinga. 2010. "Integrating Tanks into the Larger Waterscape in the Tungabhadra." In *Integrating Water Resources Management: Interdisciplinary Methodologies and Strategies in Practice*, edited by Geoffrey D. Gooch, Alistair Rieu-Clarke, and Per Stålnacke. London: IWA Publishing.

Pasupathi, M.V. 2010. *Chemmozhithamil*. Tanjore: Tamil University.

Pennycuick, J. 1886. *Papers Connected with the Periar Irrigation Project in Madras*. Public works Dept Serial no.2. Calcutta: Superintendent of Government Printing.

Pingle, Gautam. 2010. "The Historical Context of Andhra and Telengana, 1949-56." *Economic and Political Weekly*, February. http://www.epw.in/special-articles/historical-context-andhra-and-telangana-1949-56.html.

———. 2011. "Irrigation in Telengana: The Rise and Fall of Tanks." *Economic and Political Weekly*, June. http://www.epw.in/review-agriculture/irrigation-telangana-rise-and-fall-tanks.html.

Price, Pamela. 1994. *Kingship and Political Practice in Colonial India.* Cambridge: Cambridge University Press.

Principal Secretary. Irrigation-Water Resources Department-Vaigai Reservoir-Rules of Regulation of Periyar-Vaigai Systems- Procedure to Calculate Vaigai Credit and Periyar Credit at Vaigai Reservoir- Amendment to the

Rules of Regulation - Orders. Public Works (P1) Department. Vol. G.O.Ms. No. 122, 2010.

PWD. 1985. *Tank Memoirs - Gundar Basin*. Madurai: Public Works Department.

PWD. undated. “A Short Note on Manjalar Project”. Executive Engineer, Periar Vaigai division, Madurai.

———. 1887. *Administration Report [being Part 2 of the Public Works Department Administration Report].* Madras: Printed by R.Hill for Public Works Department. BL.

———. 1891. *Administration Report [being Part 2 of the Public Works Department Administration Report].* Madras: Public Works Department. BL.

———. 1931. *Administration Report [being Part 2 of the Public Works Department Administration Report].* Madras: Public Works Department. BL.

———. 1952. *Report on the Vaigai Reservoir Project in the Mathurai District*. Project Proposal. Madras.

———. 1954. *Report of Vaigai Reservoir Project*. Dam planning. Madras: Public Works Department. PWD Record Room.

———. 1995. *Groundwater Perspectives of Madurai District*. Government data. Ground Water Perspectives. Chennai: Ground Water Wing, Public works Department.

Raghavaiyangar, Srinivasa S. 1898. *Memorandum on the Progress of the Madras Presidency during the Last Forty Years of British Administration*. Madras: Government Press.

Rajan, K. 2008. *Ancient Irrigation Technology: Sluice Technology in Tamil Nadu*. First. Thanjavur: Heritage India Trust.

———. 2009. “A note on Porunthal excavations.” *Aavanam, the journal of Tamil Nadu Archaeological society*, no. 20: 109–15.

Raju, Saradha A. 1941. *Economic Conditions in the Madras Presidency 1800-1850*. Madras: University of Madras.

Ramasamy, Vijaya. 2008. “The History of Agriculture in South India.” In *History of Agriculture in India Upto c.1200 A.D*, edited by Lallanji Gopal and V.C Srivastava, First. Vol. 5. History of Science, Philosophy, and Culture in Indian Civilisation 1. New Delhi: PHISPC & Concept.

Ramaswami, A. 1972. *Tamil Nadu District Gazetteers: Ramanathapuram*. Madras: Govt. of Tamil Nadu.

Ranade, Ashwini, Nityanand Singh, H.N Singh, and N.A Sontakke. 2008. "On Variability of Hydrological Wet Season, Seasonal Rainfall and Rainwater Potential of River Basins in India (using Rainfall Data over 1813-2006) - An IITM Technical Paper | India Water Portal." *Journal of Hydrological Research and Development* 23: 79–108.

Ratnavel, S. M. 1998. "Vaigai Basin: Lower Vaigai System Deterioration and Suggested Improvements". Virudhunagar: Ratnavel, S.M.

Ratnavel, S. M., and P. Gomathinayagam. 2006. *In Search of Ancient Wisdom: Irrigation Tanks*. Madurai: DHAN Foundation.

Ratnavel, S.M. 1997. "Vaigai River Basin - Yesterday and Today." In *State Level Seminar*. Vol. 1. Trichirappalli: Irrigation Management Training Institute (IMTI).

———. 2002. *Vaigai River System: Suggestions for Improved Performance*. Virudhunagar: Ratnavel, S.M.

Ratnavel, S.M, and P Anandkumar. 2002. "Conservation and Development of Tanks through a Basin Approach: A Case Study of Gundar Basin." In *Papers and Proceedings of the Regional Workshop of the Global Water Partnership*, Madurai:93–109. Madurai: DHAN Foundation and Krishnan Associates.

Revenue Department Policy Note. 2012. Chennai: Revenue Department, Government of Tamil Nadu.

REVENUE DEPARTMENT POLICY NOTE 2012-2013. 2012. Government Policy note, 2012-13. http://www.tn.gov.in/policynotes/pdf/revenue.pdf.

Reynolds, B. O. 1906. *College of Engineering Manual: Irrigation Works*. Madras: Superintendent of Government Press. http://www.archive.org/details/irrigationworks00reynrich.

Ryots of Ramnad. Petition. 1950. "Petition from the Farmers of Sivaganga and Ramnad."

Sainath, P. 1996. *Everybody Loves a Good Drought: Stories from India's Poorest Districts*. Second. Delhi: Penguin Books.

Sakthivadivel, R, P Gomathinayagam, and Tushaar Shah. 2004. "Rejuvenating Irrigation Tanks through Local Institutions." *Economic and Political Weekly* 39 (31): 3521–26.

Sakthivadivel, R., N. Fernando, and J. D. Brewer. 1997. *Rehabilitation Planning for Small Tank in Cascades*. 13. Colombo: IIMI.

Sakthivadivel, R., N. Fernando, and C. R. Panabokke. 1996. *Nature of Small Tank Cascade Systems and Framework for Their Rehabilitation*. 13. Colombo: IIMI.

Sakthivadivel, R., S Savadamuthu, C.R Shanmugham, P.K Balakrishnan, and Arpu. 1982. "A Pilot Study of Modernisation of Tank Irrigation in Tamil Nadu." In *Proceedings of the International Workshop on Modernisation of Tank Irrigation System - Problems and Issues*, 1–21. Madras: Anna University.

Sakthivadivel, R., S Savadamuthu, C.R Shanmugham, P.K Balakrishnan, and C Arputharaj. 1982. *A Pilot Study of Modernisation of Tank Irrigation in Tamil Nadu*. Research report. Chennai: CWR, Anna University.

Sakthivadivel, R., and C. R. Shanmugham. 1988. "*Alternative Approaches to Tank Rehabilitation and Management" an Experiment*. Madras: CWR, Anna University.

Sampath, M.D. 1980. *Chittoor through the Ages*. Delhi: B.R.Publishing Corporation.

Samuel BEST Captain. 1852. *Notes on Building and Road-Making, with Rules [by Captain Samuel Best] for Estimating Repairs to Tanks and Channels: Compiled for the Use of Surveyors and Overseers, in the Department of Public Works. Illustrated by Numerous Plates. Second Edition Enlarged with an Appendix Containing Building Data and Other Tables*. Madras: Printed by Pharoah and Co and Athenum Press.

Santhalingam, So. 2006. "Pallavar kalaththil neerpppasanam (in Tamil)." *Kalvettu*, no. 69 (January): 5–7.

Sarangapani, R. 1984. *A Critical Study of Paripatal*. Madurai: Publications Division, Madurai Kamaraj University.

Sarasvati, S., and Dharampal. 1972. *The Madras Panchayat System*. Delhi: Impex India.

Scott, A, ed. 1989. “India.” In *A Directory of Asian Wetlands*. Vol. 1. Glouchester: IWRB. http://ramsar.wetlands.org/Portals/15/India.pdf.

Scott, James C. 1999. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, Conn ; London: Yale University Press.

Seeman alias Meenatchisundaram. 2010. “அரசு ஆணை எண் :122 நாள் 21.04.2010 ஐ ரத்துச் செய்து பழைய அரசாணை எண் 1689/PWD நாள் 22.11.1974 ஐ மீண்டும் அமல்படுத்த வேண்டி விண்ணப்பம் (Petition to Withdraw G.O No.122 Dated 21.04.2010 and Bring Back G.O 1689/PWD Dated 22.11.1974- Request)”. Periar Vaigai Command area council.

Seenivasan, R. 2013. “National Wetland Atlas of India- A Review and Some Inferences.” *Economic and Political Weekly* XLVIII (18): 120–24.

Seenivasan, R. 2014. “Historical Validity of Mullaperiyar Project.” *Economic and Political Weekly* 49 (4): 22–26.

Seenivasan, R., and Anand Kumar. 2004. *Vision for Village Tanks of India*. Vol. First. Madurai: DHAN Foundation.

Seenivasan, R., T. Senthilkumar, and N. Karuppusamy. 1999. “Hydrology of Tanks in Vallakulam Cascade Selected Inferences and Implications in Project Planning and Development.” *Tank Cascade* 1 (1): 1–12.

Seenivasan, R., K. Vallinayagam, S. M. Ratnavel, J. S. Inbaraj, and S. Duraipandi. 2004. “Customs, Customary Use and Rights and Tank Irrigation Management”. Madurai: DHAN Foundation.

Selby, Jan. 2003. *Water Power and Politics in the Middle East- the Other Israeli-Palestenian Conflict*. London: I.B.Tauris & Company.

Sengupta, Nirmal. 1985. “Irrigation: Traditional vs Modern; Economic and Political Weekly.” *Economic and Political Weekly* 20: 1919–38.

———. 1991. *Managing Common Property: Irrigation in India and the Philippines*. Vol. 6. New Delhi ; Newbury Park, Calif.: Sage.

———. 1993. *User-Friendly Irrigation Designs*. New Delhi: Sage.

———. 1998. “Negotiation with an under-Informed Bureaucracy: The Case of Water Rights on System Tanks of Bihar.” In Vancouver, Canada: International Association of the Study of Common.

———. , ed. 2007. “Neglected Sources of Irrigation.” In *Economic Studies of Indigenous and Traditional Knowledge*, 121–46. Delhi: Academic Foundation.

Shah, Esha. 2003. *Social Designs: Tank Irrigation Technology and Agrarian Transformation in Karnataka, South India*. New Delhi: Orient Longman.

———. 2008. “Telling Otherwise: A Historical Anthropology of Tank Irrigation Technology in South India.” *Technology and Culture* 49 (3): 652–74. doi:10.1353/tech.0.0054.

Shah, Tushaar, Madar Samad, Ranjith Ariyaratne, and K. Jinapala. 2013. “Ancient Small-Tank Irrigation in Sri Lanka.” *Economic and Political Weekly* 48 (11): 58–65.

Shamasastry, R. 1915. *Kautilya’s Arthaśástra. Translated by R. Shamasastry, Etc*. First. Government Oriental Library Series Bibliotheca Sanskrita No.37 Part II 37. Bangalore: Government Press. http://www.bharatadesam.com/literature/kautilya_arthashastra/arthashastra_1.php.

Shanmugham, C. R. 1996. “Proceedings of the Seminar - Conservation & Development of Tank Irrigation for Livelihood Promotion.” In *Conservation & Development of Tank Irrigation for Livelihood Promotion*, vii–xvii. Conservation and Development Forum (CDF) &Network of Institutions Engaged in Tank Irrigation Management (NET).

Shanmugham, C. R., and J Kanagavalli. 2005. *Technology of Tanks: The Traditional Water Bodies of Rural India*. Madurai: DHAN Foundation.

Shanmugham, C. R., and K. Kanagavalli. 2000. “Design of Supply Channels - Lifeline for Chain of Tanks.” *Tank Cascade* 2 (1&2): 65–76.

Shanmugham, C. R. Letter to Government. 2002. “Periar Vaigai River System - Performance Improvement - Suggestions for Change in Rules of Water Regulation”, March 1.

Shanmughan, Kodumudi. 1995. *Pandai Paasanap Poriyiyal* - பண்டைப் பாசனப் பொறியியல் *(in Tamil)*. First. Chennai: Thaenolai.

Sharma, Ananthanarayana, and Martin Selvaraj. 1999. "Governance of a Cascade of Tanks: Challenges." *Tank Cascade,* 1 (1): 13–21.

Sharma, C. B. S. R. 1996. "Tanks of Tamilnadu: An Ecological Revival- A National Tank Authority Is Urgently Needed." In *Conservation & Development of Tank Irrigation for Livelihood Promotion*, 73–81. Gainesville, Florida, USA: Conservation and Development Forum (CDF) & Network of Institutions Engaged in Tanks (NET).

———. 1997. *Ecography of Small Water Bodies- A Pilot Study of Five Irrigation Tanks and a Coastal Wetland in Tamil Nadu and Pondicherry.* Ecography. Pondicherry: Salim Ali School of Ecology, Pondicherry University.

Shiva, Vandana. 1988. "Reductionist Science as Epistemological Violence." In *Science, Hegemony and Violence: A Requiem for Modernity*, edited by Ashis Nandy. Tokyo: United Nations.

Shivakoti, Ganesh P., Douglas L. Vermillion, and Wai-Fung Lam. 2005. *Asian Irrigation in Transition: Responding to Challenges*. New Delhi: Sage.

Singh, Chhatrapati. 1991. *Water Rights and Principles or Water Resources Management*. Bombay: Tripathi.

———. , ed. 1992. "History of Water Laws in India." In *Water Law in India*, 289–367. New Delhi: Indian Law Institute.

Singh, Satyajit. 2002. *Taming the Waters: The Political Economy of Large Dams in India*. New Delhi: Oxford University Press.

Sinha, D.S. 1957. *Principles and Practices of Minor Irrigation in India.* Second. New Delhi: Ministry of Community Development. http://archive.org/details/MinorIrrigationIndia.

Sivaramakrishnan, K.C. 2000. *Power to the People: The Politics and Progress of Decentralisation*. Delhi: Konark.

Sivasubramanian, K, and V Gandhiraj. 2009. *Irrigation in Tamil Nadu: With Special Reference to Tank Irrigation*. Monograph 8. Themes in Social Sector

Research: The S.Guhan Memorial Series. Chennai: Madras Institute of Development Studies.

Sivasubramanian, K. 1996. “Irrigation Institutions in Two Large, Multivillage Tanks of Tamil Nadu Structure, Function and Impact.” In *Conservation and Development of Tanks for Livelihood Promotion*, 57–62. Conservation Development Forum (CDF) & Network of Institutions Engaged in Tank Irrigation Management (NET).

Sivasubramaniyan, K. 1995. “Irrigation Institutions in Two Large Multi-Village Tanks of Tamilnadu: Structure, Functioning and Impact”. Economics, Madras: Madras University.

Sloan, William. 1862. *The Judicial and Land Revenue Code. ... Madras Enactments. Vol. 1.* Madras: N.A.

Sridhar, T.S, D Thulsiraman, S Selvaraj, and S Vasanthi, eds. 2005. *Alagankulam: An Ancient Port City of Tamil Nadu*. First. Chennai: Department of Archaeology, Government of Tamil Nadu.

Srinivasa Rao, V.N. 1984. “The Origin and Growth of Legal Profession in Tamil Nadu: A Sociological Study 1640-1947.” In *The Legal Profession: A Preliminary Study of the Tamil Nadu Bar*, edited by Madhava Menon N.R, First, 262. New Delhi: Bar council of India Trust.

Srinivasan, T M. 1970. “A Brief Account of Ancient Irrigation Engineering Systems Prevalent in South India.” *Indian Journal of History of Sciences* 5 (2): 315–25.

Srinivasan, T. M. 1992. *Irrigation and Water Supply: South India, 200 B.C.-1600 A.D.* Madras: South Asia Books.

Srinivasan, V. 1990. “வைகை பாசன இயக்கம்: நோக்கமும் சட்ட நியாயமும் (Vaigai Irrigation Movement: Objects and Justification)”. Vaigai Pasana Iyakkam, Ramanathapuram.

State Planning Group, L.C Jain, T.V Antony, K.V Palanidurai, and R.C Panda. 1997. *Report on Entrustment O Powers to Panchayats*. Chennai: State Planning Commission.

Stein, Burton. 1989. *Thomas Munro: The Origins of the Colonial State and His Vision of Empire*. Oxford: Oxford University Press.

Stokes, Eric. 1973. “The First Century of British Colonial Rule in India: Social Revolution or Social Stagnation?” *Past & Present*, no. 58 (February): 136–60.

———. 1982. *The English Utilitarians and India*. Delhi ; Oxford: Oxford University Press.

Strange, William Lumisden. 1904. *Indian Storage Reservoirs with Earthen Dams: Being a Practical Treatise on Their Design and Construction*. London and New York: E&F.N.Spon and Spon & Chamberlain. http://www.archive.org/details/indianstoragere01stragoog.

Sundara Vandiyathevan, Ra. 2012. பிறமலைக் கள்ளர் வாழ்வும் வரலாறும் - *Piramalai Kallar Vaalvum Varalaarum*. First. Chennai: Sandhya Publications.

Tarlock. 2000. “Prior Appropriation: Rule, Principle, or Rhetoric?” *North Dakota Law Review* 76: 881–911.

Teclaff, Ludwik A. 1972. “What You Have Always Wanted to Know about Riparian Rights, but Were Afraid to Ask.” *Natural Resources Journal* 12: 30.

Thani Nayagam, X. S. 1966. *Landscape and Poetry: A Study of Nature in Classical Tamil Poetry*. 2nd ed. London: Asia Publishing House.

The Code of Hammurabi.

The Hindu. 1995. “Farmers to Stage Road Blockade Today”, June 11, Madurai edition.

The Society. 1895. “The Monthly Record.” *The Geographical Journal* 6 (6): 564–76.

Tirumalai, R. 1981. *Studies in Ancient Townships of Pudukkottai*. Madras: Institute of Epigraphy, Department of Archaeology, Government of Tamil Nadu.

———. 1994. *Collected Papers: Studies in South Indian Epigraphy and History of Land Organisation, Development and Accounts and Select Chola and Pandyan Townships*. First. Madras: Department of Archaeology, Government of Tamil Nadu.

———. 2003. *Pandiyan Townships, PART I- Historical Geography of the Pandyan Kingdom Reconstructed from Epigraphs of 9th to 15th Century A.D, Arranged Districtwise on the Basis of Unbifurcated Districts as in 1985*. First. Vol. 1. 2 vols. Chennai: Department of Archaeology, Government of Tamil Nadu.

Travancore (India), and V. Nagam Aiya. 1906. *The Travancore State Manual*. Trivandrum, Travancore government press. http://archive.org/details/travancorestate00aiyagoog.

Trubek, David M. 1980. "Studying Courts in Context." *Law & Society Review* 15 (3/4): 485. doi:10.2307/3053500.

Upadyay, Videh. 2003. "Customary Rights over Tanks." *Economic and Political Weekly* 38 (44): 4643–45.

Uphoff, Norman Thomas. 1986. *Improving International Irrigation Management with Farmer Participation: Getting the Process Right.* Boulder, CO: Westview Press.

———. 1992. *Learning from Gal Oya: Possibilities for Participatory Development and Post-Newtonian Social Science*. Ithaca: Cornell University Press.

Uphoff, Norman Thomas, Priti Ramamurthy, and Roy Steiner. 1991. *Managing Irrigation: Analyzing and Improving the Performance of Bureaucracies*. New Delhi; Newbury Park: Sage.

Vaidyanathan, A. 1999. *Water Resources Management Institutions and Irrigation Development in India*. New Delhi: Oxford University Press.

———. 2001. *Tanks of South India*. New Delhi: Centre for Science and Environment.

Vaigai Federation. 2006a. "Honourable Presidents Intervention requested - Denial of irrigation water rights in Vaigai River Basin due to certain government actions carried out in the past - remedial measures to protect the basic rights and equity in treatment among farmers". Poorveega Vaigai Paasana Vivasayigal kootttamaippu, Madurai, Sivaganga and Ramanathapuram District.

———. 2006b. “வைகை நேற்று இன்று நாளை: Vaigai Yesterday, Today and Tomorrow”. Poorveega Vaigai Paasana Vivasayigal kootttamaippu, Madurai, Sivagangai and Ramanathapuram District.

———. 2008. “Petition to Advisor, Water Resources, Government of Tamil Nadu”. Poorveega Vaigai Paasana Vivasayigal kootttamaippu, Madurai, Sivagangai and Ramanathapuram District.

Vaigai Pasana Iyakkam. 1991. “Plight of the Vaigai Ayacutdhars of Ramanathapuram District”. Vaigai Pasana Iyakkam, Ramanathapuram.

Vani, M. S. 1992. *Role of Panchayat Institutions in Irrigation Management: Law and Policy: Tamilnadu and Karnataka*. New Delhi: Indian Law Institute.

———. 2002. “Legal Framework for Tank Systems in India.” In *National Policy Seminar on Revisiting Village Tanks of India*. Vol. New Delhi. Madurai: DHAN Foundation.

———. 2009. “Community Engagement in Water Governance.” In *Water and the Laws in India*, First:167–21. New Delhi: Sage.

Vani, M.S. 2005. “Political Economy of Rainwater Harvesting in India: Reflections in Central and Regional Law and Policy.” In New Delhi.

Vedachalam, V. 1986. “Pandiya Naattil Neerppaasanap Panikal (பாண்டிய நாட்டில் நீர்ப் பாசனப் பணிகள்).” *Kalvettu*, 28–38.

Venkatachari, A.R. Government Proceedings. 1952. “Vaigai Scheme Report PART II”, October 1.

Venkataramani, G. 1974. *Minor Irrigation in Tamil Nadu*. Madras: Sangam.

Venkatasamy, R. 2002. *Salient Features of Periyar-Vaigai Project*. Synthesis report. Madurai: Agricultural Engineering Department.

———. 2007. *Mullaipperiyar Anai-Varalatru Vivakaarangalum Indraiya Vivakaarangalum (in Tami)*. Coimbatore: Thamil Oasai Pathippagam.

Vermillion, Douglas Lynn. 1991. *The Turnover and Self Management of Irrigation Institutions in Developing Countries: A Discussion Paper for a New Program of the International Irrigation Management Institute*. Colombo: International Irrigation Management Institute (IIMI).

Vincent, Claude, and (India: Presidency) Madras. 1882. *Report of a Tour of Inspection of Irrigation Works in Southern France and Italy and of Some of the Principal Masonry Dams in France ... in 1881*. Madras: printed by E. Keys at the Govt. Press.

Voelcker, John Augustus. 1893. *Report on the Improvement of Indian Agriculture [With Map]*. London: Eyre & Spottiswoode.

Wade, Robert. 1981. "Collective Responsibility in Philippino Irrigation: A New Approach." *Economic and Political Weekly* 16 (39): A99–A102.

———. 1987a. *Village Republics: Economic Conditions for Collective Action in South India*. Vol. 40. Cambridge: Cambridge University Press.

———. 1987b. "The Management of Common Property Resources: Collective Action as an Alternative to Privatisation or State Regulation." *Cambridge Journal of Economics* 11 (2): 95 –106.

WAPCOS, New Delhi. 1995. *Comprehensive System Study of Vaigai River Basin, Detailed Final Report Volume*. Consultancy report Volume 1. Public works Department, Periyar Vaigai Project, Madurai. Chief Engineer's office of the WRO-PWD, Madurai.

Washbrook, D. A. 1981. "Law, State and Agrarian Society in Colonial India." *Modern Asian Studies* 15 (3): 649–721.

Whitcombe, Elizabeth. 1972. *Agrarian Conditions in Northern India: The United Provinces under British Rule 1860-1900*. Berkeley: University of California Press.

Wiel, Samuel. 1914. "Theories of Water Law." *Harvard Law Review* 27 (16): 530–44.

Wierner, Martin. 2009. *An Empire on Trial: Race, Murder and Justice under British Rule, 1870-1935*. Cambridge: Cambridge.

William Grant. 1857. *The Circular and Standing Orders of the Department of Public Works from 1833 to 8th July, 1857: Forming a Complete Code of Rules for the Guidance of the Members of the Department on All Matters of Official Routine / Compiled by William Grant, First Uncovenanted Assistant to the Chief Engineer, DPW*. Madras: D.P.L.C. Connor, at the Press of the Society for the Promotion of Christian Knowledge.

Wittfogel, Karl. 1957. *Oriental Despotism a Comparative Study of Total Power*. New Haven: Yale University Press.

World Bank. 1986. “India - Periyar Vaigai Irrigation Project- Project Completion Report”. World Bank. Available at, http://www.wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&siteName=WDS&entityID=000333037_20081204002305.

———. 1995. “India - Periyar Vaigai Irrigation II Project. Project Completion Report”. World Bank. Available at: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&siteName=WDS&entityID=000009265_3961008032535.

———. 2000. *Overview of Rural Decentralisation in India*. Vol I. Washington, D.C.: World Bank. http://www1.worldbank.org/publicsector/civilservice’june2004seminar/RuralDecent.pdf.

Yin, Robert K. 2008. *Case Study Research: Design and Methods*. Applied Social Research Methods Series. London :: SAGE.

Zvelebil, Kamil. 1964. *Tamil in 550 AD: An Interpretation of Early Inscriptional Tamil*. PRAGUE: Czechoslovak Academy of Sciences.

Zacharias, CWB. 1950. *Madras Agriculture*. Madras: University of Madras. http://archive.org/details/MadrasAgriculture.