Hydropolitical Vulnerability of The Mullaperiyar Dam: Institutions Involved and Options Explored

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Abstract

Most countries in the world, whether developed or developing economies, are constructing dams, be it for energy provision, irrigation or flood control. Dams are not just technological fixes but, represent an amalgam of technical, social, economic, political and sometimes legal processes. If the hydro-political system lacks the institutional capacity to accommodate the physical, institutional and social changes around water infrastructures there is a potential for conflict and risk to human security. This paper tries to analyse the sustainability of dams (political, institutional and socioeconomic) in terms of vulnerability, framed within the discourse of dam safety. Drawing upon the insights derived from research focusing on hydropolitical vulnerability, the paper attempts a multi-scalar analysis of the conflict between the states of Kerala and Tamil Nadu over the Mullaperiyar Dam while focusing on the questions of hydropolitical vulnerability relating to multipurpose dams, across political boundaries and both at the national and local level. The paper teases out the complex nature of dams and analyses the roles of institutions to understand the relationships between power, human security and the socio-technical system. The paper brings into focus the urgent need for an inclusive, yet resilient framework of river basin management designed for assessing the risk related to dams and suggests conflict resolution strategies.

INTRODUCTION

Water has become the fuel of conflict in many regions around the globe and our laws are not adequate to address these conflicts. Though there is a law governing interstate conflict, it deals with adjudication only and hence is severely limited. Large dams became possible with modern engineering practices in the 1850s through the application of science and hydraulic engineering, first in Europe and then in other parts of the world. The purpose of these dams was to aid in irrigated agriculture. Colonial irrigation in India advocated the position that the state, in partnership with science, could tame rivers and thereby contribute to human welfare. This ideology dominated the use of modern engineering techniques for huge and multifarious irrigation structures during the colonial era (Postal, 1999). It was in this period that India emerged as a hydraulic society with a strong, centralised bureaucratic control over water development and its management. British colonisation brought three major influences – a

transformation from a resource gathering and food production economy into a commodity oriented economy; a decrease in the importance of the long standing social relations and increased importance given to wealth (Gadgil and Guha, 1992). In addition, the state took control of surface water and ownership of community irrigation.

A quantum leap in irrigation was initiated in the 1830s through the work of Sir Arthur Cotton and Major Cautley in southern India. By this time the East India Company ruled most of India and realised the immense opportunity in irrigation by combining the interests of charity and commerce (Whitcombe 2005) in repairing some of the great irrigation works of pre-colonial times,for example, the Grand Anicut in Tanjore and the Jamuna canals in the Delhi region (Habib, 1982). In order to gain quick economic returns from water development, the colonial government attempted to initiate large scale irrigation projects in the Deccan region. As a consequence, a new specialist cadre of irrigation experts and institutions were created to regulate water for three colonial goals – (i) financial (low operation costs and high revenue, (ii) socio-political (famine and drought preclusion) and (iii) administrative (central control over water resources). Through implementation of policy measures involving hydraulic interventions, the British radically transformed India and these policies even today in post colonial times define and sustain complex equations between land and water. Developing water as a resource was considered critical and pertinent to the enhanced British government income, and also to the new forms of state power.

DAMS AND HYDROPOLITICAL VULNERABILITIES

Dams, perhaps more than any other infrastructural investments, represent a mix of social, economic and ecological processes. Today, new dams are being planned and constructed by both developed and developing economies to provide energy, water and flood control to growing populations in riparian regions and distant urban areas. At the same time, the debates about their social and ecological costs are on the rise because of the changing environmental values, large scale displacement of population and the economic cost of maintaining aging structures. Extensive literature evaluating the impacts of dams suggests that when exploring socio-ecological systems such as dams it is important to acknowledge the linkages between the landscape and human history in order to locate the economic and environmental costs and benefits in context (Nazm 2014; Mehta, 1997; Mehta, 2000; Mehta, 2001; Mehta, 2005).While defining the linkage between knowledge, technology and power underpinning the dam projects in many countries, Goldsmith and Hildyard noted that ‘no dam is built in a political vacuum’(Goldsmith and Hildyard, 1986). As structures to control and manage water, dams are closely linked with governmental mandates, legal arrangements covering their construction, operation and ownership as well as the distribution of costs and benefits derived from them. In addition to this, the political and physical means of managing water are dominated by political will, bureaucratic priorities and advantaged interest groups.

The term “hydropolitics” was coined by Waterbury in1979 (Waterbury 1979). Hydropolitics relates to the ability of geopolitical institutions to manage shared water resources in a politically sustainable manner, i.e., without tensions or conflict between political entities (HDR, 2006). In the last three decades, attention to hydropolitics surrounding water resources has engaged with the likelihood of contestation and conflict among various water users at local, national and international levels(Dupont, 2001; Postel and Wolf, 2001; Shiva, 2002; Swain, 2001; Toset et al., 2000). More specifically, the subject of hydropolitics has emerged as a systematic study of the nature of, potential for and various dimensions of conflict and cooperation between parties over water resources. In the face of growing investment and interests in water management and control, hydropolitics is emerging as a complex arena of interstate relations with choices for water users shaped by unique combinations of biophysical features of basins with multiplicity of historical, political, economic, strategic and cultural circumstances specific to water units (Sneddon and Fox, 2006). An evaluation of the indicators of international water conflict by Wolf et al indicates that dams are only weakly linked to water disputes (Wolfe et al., 2003). However, conflicts surrounding dams whose economic and ecological effects cross political boundaries within nations have been extensively documented (Elhance, 2000). These examples suggest that in the absence of institutional mechanisms combined with uncertainties inherent in interstate relations, competing uses of water are capable of creating settings conducive to disputes.

Within the framework of sustainability, the terms resilience and vulnerability are used to understand the ability of biophysical systems to adapt to changes (Gunderson and Pritchard 2002). In recent years, the discourse on sustainability as well as vulnerability has broadened to take into account human systems in understanding natural systems. Simultaneously, research on water conflict and security has announced a sharp shift from traditional approaches focusing solely on issues of scarcity and wars. The new approaches to understanding water crisis incorporate human-environment linkages to understand the nature of conflict ((Joy et al., 2007; Vogel and O’ Brien 2004). More crucially, the concept of hydropolitical vulnerability underscores the compelling associations between politics, water management and resource inequalities (Gupta and van der Zaag, 2008). The resulting studies inspired a turn towards reconsidering water conflicts as being both technical and political challenges in the light of the changing demand and supply conditions (Wolf et.al.2003).

“Hydropolitical vulnerability” is defined as the risk of political dispute over shared water systems (UNEP, 2004). According to Wolf *et al* (2003), “The likelihood of conflict rises as the rate of change within the basin exceeds the institutional capacity to absorb that change”. For them, biophysical changes combined with institutional changes which outpace the institutional capacity to deal with such situations give rise to most of the water conflicts. The physical changes may include extreme weather events (unanticipated droughts or floods), structural failure and other such conditions making the spatial and temporal distribution of water resources less predictable. Institutional mechanisms refer to the availability or presence of cooperative regimes, technical knowledge, treaties and river basin organisations in the wake of a dispute or

disagreement (Oki and Kanae, 2006). Such situations introduce uncertainty and variability for which current institutional instruments such as laws, treaties, organization and knowledge level may not be prepared.

The question of power becomes important in the discussions about hydropolitical vulnerability as the term relates to the ability of actors to manage water resources in an overtly political manner. Studies have basically identified four forms of power which are usually used to evaluate disputes and conflict over water: geography; material power; bargaining power; and ideational power. Geographical power refers to the distinct advantage that geography or location assigns to an upstream state to control and manipulate the flows, i.e. to dam or divert them (Magee, 2006). Material power is visible in the form of economic power, technological capability, international political and financial support which allows a state to exercise control over water with little consideration of upstream or downstream stakeholders (Cascão and Zeitoun, 2010). Bargaining power refers to the ability of actors to influence the agenda and rules in setting political parameters of control through institutions and incentives (Bachrat and Baratz, 1962). Finally, ideational power, according to Casao and Zeiton, represents the capacity of disputants to force and legitimize particular ideas and narrative and thereby control the perception of the water allocation approaches (Cascão and Zeitoun, 2010).They argue that ideational power in water management is used by influential actors and usually exercised through knowledge tools, sanctioned discourse and means of generating data and information related to water management. In the context of dams, causes and impacts (both positive and negative) of a dam often lie outside the immediate watershed of the dam. Magee uses the term 'powershed' to explain hydropolitics by shifting the focus from physical structure of the dam to the relationship between actors being affected by them. The conceptual framework of powershed encompasses the regions that politically and economically benefit from dams as well as the regions that are being socio-ecologically impacted in order to map the politics of cooperation and conflict (Magee, 2006).

SOCIO-POLITICAL HISTORY OF THE PERIYAR PROJECT

The Periyar Project was one of the inspirational feats of nineteenth century engineering. The project inspired awe and admiration of engineers, geographers and planners across the world. The Mullaperiyar Dam, as it later came to be known, built between 1887 and 1895, was thought to be an engineering marvel. Beginning in the late nineteenth century, the British focused on harsh climatic conditions as the sole reason for recurring bouts of drought, famine and scarcity in India. The idea of damming the river Periyar to divert its flow to irrigate the arid regions of Madurai in Madras Presidency (presently Tamil Nadu) was first explored in 1850. Historically the area had experienced frequent famines resulting from crop failures. Water scarcity had not only made the agricultural prospects grim but also led to severe distress and migration in the 1861-62. The Madurai region faced nine famines during the 19thcentury and accounts of dry years seen in old Tamil literature and reflected in the records of British administrators indicate

that the expenditure incurred on famine relief works was seen as a major cause for the loss of revenue. (Pandian, 2009)

The repeated famines in the Madurai region invited the attention of various commissions including the Famine Commission and the Irrigation Commission for a famine prevention project. Catastrophic famines of 1876-78 prompted the colonial administration to construct a category of protective irrigation measures to deal with the situation (Pandian, 2009). Hence, the Periyar project was seen as essential. The British engineers believed that the 'waters of the Periyar were useless to Travancore (now Kerala) as it remained an uninhabited forest of little value' (Mackenzie 1899). The Periyar Dam was said to have been proposed as a response to check famine in the Madurai countryside and to supplement the much needed irrigation water for the Madurai region, which would in turn generate revenue.

Many critics have noted that the rigors of the colonial political economy, in which the market rather than the state influenced public welfare, aggravated the mass sufferings (Sen and Dreze, 1991; Zook, 2000). According to Mitchell an expertise like engineering has no autonomous scientific status: "the projects themselves formed the science" and the human agency associated with engineering only "seems to come first" (Mitchell 2002). Studies have drawn attention to the concern of the colonial state for revenue and the free operation of the grain market as crucial reasons for severe famines in colonial India. During this period, European writers increasingly turned their focus on big technologies such as railways, telegraph, electricity and mechanical devices to modernise human society and nature (Kumar 1995). The new developments of physical sciences and mechanical engineering began influencing the popular as well the official imagination of landscapes. Such discourses reverberated in the portrayal of hydraulic technologies as a means and model to manage and manipulate society as well as nature (Swyngedouw, 2009). Canalising water therefore provided a template for not only disciplining unruly and refractory rivers but also the population living along them. In colonial South India, the Periyar Project was imagined as a productive enterprise to realise the twin goal of civilising nature and the agrarian citizenry (Pandian, 2009). Some scholars believe that the linking the Periyar with the Vaigai was conceived long before the British conquered that part of present-day India. It was an idea of those "natives" from the far away Ramnad (Ramanathapuram) kingdom located at the tail end of the Vaigai River. This proposal of the natives was rediscovered by the colonialists for their own benefit.

The proposal of linking the Periyar with the Vaigai was first discussed by the minister of Ramnad. The plan was to bring the waters of the Periyar by diversion to Ramnad territory once it crosses Madurai and Sivaganga. The minister of Ramanad was even said to have negotiated with the princely state of Travancore to build a dam. But this plan was dropped due to the unstable political situation in the country which was unfavourable for such projects (Seenivasan, 2014). It appears from the literary evidence that the Vaigai River had been fully harvested with very little

water flowing into the sea as far back as the 12th century. An archaeological report made on a village located at the tail end of the Vaigai recorded, “By the 12 century AD (or even earlier) it had ceased to join the sea” (Sridhar et al 2005). All tanks in this part of the country were man-made and developed to utilise the undependable and meagre rainfall. Several attempts had been made over the years to link these tanks with many local streams and rivers. As Seenivasan points out, the conception of the Periyar Project by the Ramnad kingdom might have had its basis in the historical understanding of water supply source linking already prevalent in this region (Seenivasan, 2014).

Whatever may have been the reason behind the commencement of the Periyar Project, it was an affirmation of the colonial state’s commitment to the region and for its planners. This project also confirmed that nature could be bent to serve the people of the region. In the words of Col. Sandes, the dam was ‘one of the most extraordinary feats of engineering’ (Sandes, 1933) and just a century later, the awe and admiration for Mullaperiyar dam gradually morphed into morbid fears.

The Periyar Project

The idea of diverting waters of Periyar to Madurai was proposed by James Caldwell in 1808 but was abandoned because of its cost. Later on, in 1850, construction of a small dam and a channel began to divert a small tributary of the Periyar, the Chinna Mulayar, based on the proposal of Captain Faber. However the work stopped due to high construction cost. In 1867, military engineer Captain J.G. Ryves carried out a study and drew up a plan to construct an earthen dam across the Periyar. His plan did not receive much attention until the region was hit by the devastating Madras famine of 1876-78. The construction of the dam commenced in 1887 after the Secretary of the State of India for Periyar irrigation (British Government) and the princely state of Travancore (now Kerala) entered into an agreement, a lease indenture, for 999 years. As per the agreement 8000 acres was leased by Travancore to Madras for constructing a water reservoir across Periyar River in Kerala. The project in its final form was carried out by Col. John Pennycuick, of the British Army Engineering Corps. Several tonnes of construction material had to be moved for which five different methods of conveyance were arranged (Mackenzie, 1899). The resulting structure was a reservoir, 176 feet high with impounding capacity of 10.56 thousand million cubic feet, which helped irrigate over 3 lakh acres of dry land in Tamil Nadu. The construction of the dam was completed in 1895(Mohanakrishnan, 1997).

The geographical area of the Periyar Project covers the Periyar River Basin in Kerala and the recipient Vaigai River Basin in Tamil Nadu. The river Periyar is a perennial river which originates from Sivagiri ranges in the Western Ghats, 80 km south of Devikulam at an elevation of about 2400 m and runs through the districts of Idukki and Ernakulam before joining the Arabian Sea. River Periyar has a catchment area of 5284 sq. km within Kerala and 114 sq. km in Tamil Nadu. Annual runoff of this river is 434.80 TMC. The Mullaperiyar dam is situated in the upper reaches of Periyar River after its confluence with Mullayar tributary, at an elevation of

about 850 m above mean sea level, in the protected forests of the Periyar Tiger Reserve (PTR) in Kerala. Major hydroelectric projects such as Idukki, Lower Periyar, Idamalayar, Maduppatty, Neriamangalam, Panniar etc. are located in this river and are utilizing its water.

River Vaigai is a seasonal river and its basin covers an area of 7030 sq.km and extends over the districts of Dindigul, Madurai, Theni, and Ramanathapuram. The river originating in the Varshanad ranges of the Western Ghats has been abstracted through a large number of irrigation tanks. Surrounded by the ranges of Western Ghats on the west, the Kottaikara Aru basin on the north and Uttarakosai Mangai Aru basin on the south, the Vaigai basin tapers down towards the Bay of Bengal. It lies on the leeward side of the Western Ghats and therefore does not get the benefit of South West monsoon. The basin receives an average rainfall of about 800 mm and relies mainly on the north-east monsoon which is erratic and is subjected to vagaries of nature (Mohanakrishnan, 1997).

Table 1: Salient Features of Mullaperiyar Dam and Allied Structure

Location	
State	Kerala
Latitude	9° 31’ 30’ ‘N
Longitude	77° 8’ 45’’E
River	Periyar
Reservoir	
Water Spread Area	20.55 sq.km (at+136 ft)
Water Spread Area	26.23 sq.km (at+142 ft)
Water Spread Area	37.93 sq.km at+152 ft
Catchment area	624 sq. km
Full Reservoir Level	+46.33 m (+152 ft)
Maximum Water Level	+47.24 m (155 ft)
Gross Capacity of Reservoir	443.23 M cu m (15.662 TMC)
Probable maximum flood	6003 Cumecs
Recorded Maximum flood in the year 1943	8453 Cumecs
Main Dam	
Type	Composite gravity structure
Length	366m (1200ft)
Top of dam including parapet	+48.16 m (158 ft)
Height of dam from deepest foundation	53.64 m (176 ft)
Top width of dam with parapet	3.66m (12 ft) 6.40m after repairs
Age of the dam	120
Spill way	
Location	Right saddle
Crest level	+41.45 m (136 ft)
Number of vents	10
Number of new vents	3

Baby Dam	
Location	Left bank Saddle
Type	Composite gravity structure
Top of dam	48.17m (158 ft)
Length of dam	73.15 m (240ft)
Height of dam	16.48m (54 ft)
Diversion Tunnel	
Length	1920 m (6300ft)
Sill level of tunnel	+31.70m (104 ft)
Shape	Horse shoe, concrete lined
Area of present cross section	14.1 Sq m
Carrying capacity	59.51 Cumecs
Water Drawn by Tamil Nadu	
Pre 1979	17.0 TMC
Post 1979	19.5 TMC
Area irrigated before 1979	1,71,307 Acres
Area irrigatedin 1992-93	2,31,412 Acres
Annual Benefits to Tamil Nadu	
Power Generation	4 x 35 MW installed capacity, 500 Mu
Average Power Generation	422 Mu
Income at Rs.5 per Unit	Rs. 2110 Million
Area Cultivated	2, 30, 000 Acres
Annual Benefits to Kerala	
Lease Rent at Rs. 30/ Acre	Rs. 2, 58, 000 (Average)
For 422 Mu of Power	Rs. 6, 41,000 (Average)

The Anatomy of Mullaperiyar Dam Conflict

In an inter-basin and inter-state project like Mullaperiyar where two river basins have been interlinked through water diversion, a conflict over water utilization and allocation issues is almost inevitable. However, having been built 120 years ago, the safety of the Mullaperiyar dam invariably forms the central part in the current conflict. Powerful political interests that control the conflict, point out the need to arrive at an inclusive perspective in conceptualizing river basins that can take into account these extended boundaries of the hydrological basin.

The Mullaperiyar project lease deed was originally executed between the Secretary of the State of India represented by Madras Presidency and the princely state of Travancore on 29 October 1886. As per the lease deed, the *Maharaja* of Travancore had given legal consent to the Madras Presidency to proceed with the dam construction. An area of 8000 acres of land for submergence and another 100 acres of land for execution and preservation of the irrigation works were also leased out. The lease period was specified as 999 years and a lease rent of Rs.5 per acre was

fixed. In the 1930s, the Madras government proposed to generate electricity using the diverted water but Travancore objected to this and the matter was left for arbitration (Mackenzie, 1899). The two arbitrators appointed by each state differed and finally an Umpire was referred to, who gave the judgement that the lessee had no right to use the Mullaperiyar water for any purpose other than irrigation. In addition, the judgement also declared that if it is necessary and possible to use hydropower, the lessee has the right to generate and use electricity for irrigation purpose only (Mohanakrishnan, 1997).

In 1954, Tamil Nadu started construction of a hydroelectric project using Periyar waters. The extension of the irrigation command of the Periyar project along with the construction of the Vaigai reservoir in 1959 transformed the Vaigai basin landscape considerably. Around the same time, dam construction had gained currency in most parts of India as the most efficient means to deal with climatic uncertainty. In the post-independence era, even though many of the agreements made during colonial period were nullified, the two states of Kerala (successor to Travancore) and Madras (successor to Madras Presidency) agreed informally to continue with the Periyar Lease Deed of 1886. Later on, from 1959, Madras started generating hydropower using the Mullaperiyar waters without any formal agreement with Kerala.

In 1970, two supplemental agreements were signed between the successor Government of Kerala and Tamil Nadu. The first agreement increased the lease rent from Rs. 5 per acre to Rs. 30 per acre and gave fishing rights in the Periyar lake to Kerala. It was also agreed that all other conditions and conventions of the lease deed will remain in force. Secondly, Tamil Nadu was allowed to generate electricity for which it would pay and annual amount according to the electricity generated (MoWR, 2010)

After a series of heavy floods in 1961, newspapers in Kerala started warning the residents of Idduki that they had been living in ignorance of a threat which at any time could take thousands of lives. It was felt that the water storage lake behind the Mullaperiyar Dam had developed several cracks and could breach, which would result in massive floods that could inundate acres of land leading to major disasters downstream (Madhusoodhanan and Sreeja, 2010). Both the Central Water Commission (CWC) and the Centre for Earth Sciences Study (CESS) had reported leaks and cracks in the dam. Shortly afterwards, the dam evoked quite a different response from the people living around. The public concerns grew in the aftermath of the Machhu II dam failure in Gujarat in 1979. The questions about the dam's fragility were raised in the same year when an earthquake hit the area. Kerala approached the Union Government in 1979 for investigating the issue. Towards the late 1970s, the development of hydro-power and irrigation projects in the Periyar basin by Kerala were seen with suspicion by Tamil Nadu, which asserts its right over the dam based on the lease agreement of 1886.Subsequently the public discourse started in Kerala on safety of Mullaperiyar dam was read as an attempt to claim its waters. Since then, the concerns over the safety of the dam have been a bone of contention between Kerala and Tamil Nadu.

Expert bodies such as the Indian Institute of Technology, CWC and CESS have expressed doubts over the robustness of this 116-year-old dam. One of the studies even suggested that the foundation and structure of the dam cannot withstand an earthquake of the magnitude of 6.5 on the Richter scale. Its unique construction material and geological and seismic location have been pointed out as the main reasons for its vulnerability (Hindu 2011).In response to the safety concern related to the dam, Central Water Commission proposed medium term and long-term measures for strengthening of the Mullaperiyar Dam and to lower the reservoir level to 136 ft. In 1986, CWC in its 'Memorandum on Rehabilitation of Mullaperiyar Dam' asked to raise the water level to 152 ft after carrying out the strengthening measures. The strengthening measures were carried out much later in the 1990s. Meanwhile, the government of Kerala intimated the CWC that the memorandum was not acceptable to it and the Full Reservoir Level (FRL) should be maintained only at 136 ft. Kerala argued that even after carrying out the strengthening works they estimated that the old structure was not strong enough and the memorandum was not in line with the decision taken by a joint team of engineers of Kerala and Tamil Nadu in 1979. However, people protesting in Tamil Nadu called for the restoration of water level in the Mullaperiyar dam. During 1997-98, Mullaperiyar Environmental Protection Forum from Kerala and Periyar-Vaigai Single Crop Cultivating Agriculturist Society filed writ petitions regarding the Mullaperiyar issue before Kerala and Madras High Courts respectively. These petitions were transferred to the Supreme Court of India (SC) to avert the possibility of conflicting orders from the two High Courts. After hearing the transfer petitions, SC directed CWC to hold a meeting of both the Chief Ministers to amicably resolve the issue. However, no consensus was reached between the Chief Ministers due to serious differences on the issue. In 2000, the Ministry of Water Resources (MOWR) constituted an expert committee headed by CWC to go into the details of the safety of the dam and discuss the issue of raising the water level in the Mullaperiyar reservoir. This committee submitted its report in the same year (Madhusoodhanan and Sreeja, 2010).

In its final judgement in 2006, the SC struck down the Kerala Irrigation Water Conservation Act law that sought to restrict the water level in Mullaperiyar dam andallowed Tamil Nadu to raise the water level of Mullaperiyar reservoir to 142 ft and to carry out the remaining strengthening measures. Concluding that there was no threat to the safety of the 120-year-old dam, the court set up a three-member committee under whose supervision the water level would be increased. However, In March 2006, the Kerala State Legislature amended the Kerala Irrigation and Water Conservation Act, 2003 and empowered Kerala Dam Safety Authority (KDSA) to evaluate safety of all dams in Kerala. KDSA was also empowered to advise the government to suspend the functioning or to decommission a dam if public safety so demanded. It listed 22 dams constructed between 1895 and 1963 under its jurisdiction and placed the Mullaperiyar dam in the schedule of 'Endangered Dams'. The amendment restricted its FRL at 136 ft and the case again went to the SC with Tamil Nadu challenging the validity of the amended act of Kerala in its application to Mullaperiyar dam.

In July 2011, Idduki district of Kerala experienced a series of tremors, the latest one hitting the region on 26 November 2011. A relay hunger strike initiated by Mullaperiyar Agitation Council was soon going to complete its fifth year. Although the intensity of the earthquake was slight, around 3.2 in the Richter scale, it muddled the already turbulent issue of the Mullaperiyar Dam. Soon after this earthquake, the water level in this dam rose to about 136 feet which is supposedly much larger than its capacity. In Kerala, the debates around this controversial dam resurfaced. The anti-dam lobby vociferously argued that the dam poses risks for a considerable part of the population and should be addressed urgently. Voices in Kerala, as in the past, questioned not only the stability of Mullaperiyar dam but also the propriety of the agreement made in the British period. By contrast, the state government of Tamil Nadu asserted that the dam was in fact safe. However, the following days witnessed several protests and hunger strikes in Idukki and the other adjoining districts calling for the decommissioning of this dam. An all-party delegation from Kerala submitted a memorandum on the safety concerns related to the Mullaperiyar dam to the Prime Minister of India. The Mullaperiyar issue highlights the challenges of supply side approaches of river basin planning in India.

Hydro-political Fault lines

Although the Periyar project is an interstate river water diversion scheme and does not entail any water sharing between the states, the conflict has not been over water allocation but primarily centred on the safety of the Mullaperiyar dam. However, since 2006, the issue of right over the water and unequal distribution of risk posed by and benefits derived from the project have also emerged as the focus of conflict between the two states. With the growing water vulnerability and changing nature of hydro-politics in India, the Mullaperiyar dam conflict has brought out some other issues relevant for dam management in India. In this sense, the study conflict serves as a case to explore the complex and multilevel web of hydrology, technicality, legal and institutional realities influencing the way water is accessed and controlled in India. It is therefore necessary to tease out the sub-text of the dominant discourses defining the vocabulary of the Mullaperiyar Conflict.

Water scarcity and Interstate relations

Water has emerged as a contested resource between the two states of Kerala and Tamil Nadu. Most of the inter-state water projectsof Tamil Nadu, conceived and set up by the colonial administration, were based on the idea of excess and ‘unutilized’ water of rivers, which can be dammed to irrigate arid regions. However, the changing nature of water demand and scarcity over years in its neighbouring states has redefined the colonial notion of ‘surplus’ and ‘unutilized’ waters (Madhusudanan and Sreeja 2010). For instance, in the past few decades, Kerala has started experiencing widespread water shortage which has led to a greater demand for water. As a consequence the state has begun to take a more assertive stance on the matters related to its water resources.

The repercussions of the legal battle over the dam have also shaped various other dimensions of interstate relations. In recent years, inter- and intra-state political power struggles have referred to the dam issue. In Tamil Nadu, water has always been a sensitive political issue. Historically, legal moves surrounding water rights and its availability such as in the case of Cauvery and Mullaperiyar has led to intense socio-political outburst. In 2006, after Kerala passed the controversial amendment, the dam issue acquired a different flavour in both the states. The agitation over the Mullaperiyar dam turned violent with incidents of attacks against a few business establishments owned by individuals belonging to Kerala in Tamil Nadu (The Economics times, 2011). Similar incidents were reported in Kerala with Youth Congress workers pelting stones at trucks from Tamil Nadu (Indian Express 2011).The major political parties in Tamil Nadu have tended to advocate the raising of water level to 142 ft. in the dam. Political parties in Kerala tried to gather public support for the possibility of a new dam by arguing that the old dam is worn out and weak and hence could pose a threat to the downstream areas of Periyar. Pressurizing strategies of the various political factions of Tamil Nadu involved hunger strikes and economic embargoes and traffic restrictions between the two states. The protesters threatened to stop supply of agricultural produce to Kerala and blocked inter-state traffic on the national highways and arterial roads. In other words, the hydro-politics surrounding the issue has pulled various aspects of inter-state relation into the realm of dam conflict.

In Kerala, there is a sense of injustice underpinning the political discourse around water against Tamil Nadu due to the interstate river water agreements of Parambikulam Aliyar Project and Periyar project (GoK, 1994; Ravi et al., 2004). The general displeasure and public pressure to address the increasing water and power problems in the state can be visible in the sentiments reflected by political actors. For instance, the Kerala Assembly unanimously passed a resolution against the Pamba-Achankovil-Vaippar link and approval of preliminary work on a new dam to replace Mullaperiyar Dam. In fact, the popular social position on the Mullaperiyar dam is that Kerala should defend its right over its rivers in a more strategic manner as Tamil Nadu has always had an upper hand in water issue because of its influence over the coalition politics at the Centre. In recent years the lack of risk communication to the public coupled with trust deficit between the states has led to hysterical public responses on both the sides.

Technical Imbroglios:

(1) Water Level – The maintenance of water level at Mullaperiyar dam is one of the main points of disagreement between Kerala and Tamil Nadu. Kerala argues that the century-old dam is not structurally strong enough to withstand water above 136 ft. and Tamil Nadu claims that since the strengthening work ordered by CWC has been done, the water level should be restored to its original height of 142 ft. The amendment of the Irrigation and Water Conservation Act of Kerala restricting the water level at Mullaperiyar permanently at 136 ft. aggravated the conflict as Tamil Nadu complained that the reduction in the water level since 1970s, has led to crop failure in 8000 ha of agricultural lands relying on Mullaperiyar waters (GoK, 2006). Kerala countered this by pointing out that the Mullaperiyar waters are now being used to irrigate more land than what it

was originally planned for (MoWR, 2010). Tamil Nadu has the counterargument that cultivated area has expanded due to better water management practices on their side.

(2) Safety – One of the primary technical issues has been the safety of the people living in Kerala, downstream of the dam. The safety concerns are built on the fact that the dam has outlived its life and that it was built with old technology. Adding to these apprehensions of the resident population were the instances of leaks observed in the dam, leaching of the *surki* mortar, seismic disturbances and severe floods. According to Kerala, if the dam collapses, it would wash away a stretch of about 25 km between Mullaperiyar and Idukki dams affecting about 0.1million people. If this causes damage to Idukki dam, it would further destroy human settlements of millions of people. In 2006, Kerala employed experts from IIT Delhi and IIT Roorkee to study the safety related parameters and they concluded that the dam was vulnerable to seismic activities. Tamil Nadu has read Kerala's arguments on dam safety as a ruse to deny them water. They asserted that after the strengthening works the dam is safe and that even if it breaches, the downstream dam at Idukki will be able to contain the waters.

(3) Role of technical Institutions – The Mullaperiyar conflict has brought into fore the inadequacy of the Indian State to formulate a legally binding accountability mechanism to assess the safety of dams. The dam safety issues falls in the domain of Ministry of Water Resources. However, it does not have a comprehensive strategy to address dam safety related issues which have serious implications to rivers and dependent populations.

In the case of Mullaperiyar dam, the technical matters pertaining to safety were presented before the technical authority at the Centre which acted by restricting the water level and suggesting the strengthening measures. Ambiguity in the role of technical institutions led to the tussle between Kerala and the Centre over the authority to decide on the safety of the dam. To make the matter worse, the CWC-led expert committee with representatives from Kerala and Tamil Nadu failed to reach an amicable solution. Later on, Kerala approached other technical institutes to conduct independent assessments and based on their findings, passed legislative measures to restrict the water level at Mullaperiyar to ensure its safety. These moves have led to increasing mutual distrust and public panic in both the states.

Legal Imperatives: The Periyar Lease Deed

As far as the lease deed is concerned, Kerala has a long standing grievance about the terms of lease and its amendment in 1970 which provides Tamil Nadu entire rights over waters of a tributary on which it has no riparian rights. Kerala also points out that there was no provision made for the review of the deed when it was amended in 1970 and the deed period (999 years) is too long. Moreover, it feels there are disparities in terms of distribution of risk and benefits and the deed is highly unfair to the donor. One can see that Kerala's insistence on a new dam is to also lay open the possibilities for a new deed where it can have more say. The strong demand on the part of Kerala for a new dam can be regarded as an attempt to rectify these deficiencies with

regard to the existing deed along with allaying its security concerns. On the other hand, Tamil Nadu is quite content with the deed and resists any changes to it in order to ensurewater availability. It has opposed Kerala's move towards a new dam as it could endanger its rights even though Kerala claims that it will ensure water provision to Tamil Nadu.

CONFLICT RESOLUTION

The Mullaperiyar dam had been designed to hold waters up to a height of 152 ft above its but is currently not being permitted to hold more than 136 ft because of the issue of safety, as the dam is more than hundred years old. Despite the fact that the main concern is the issue of safety there are other underlying problems that have led to a major conflict that has raged for over a period of 40 years. The reason for the complexity of the issue lies in the lease deed (mentioned above) signed in 1886 between the erstwhile Maharaja of Travancore and the British which stipulated that all the waters of the Mullaperiyar were to be diverted to the erstwhile British territory of Madras Presidency for a time period of 999 years in lieu of a nominal compensation to the donor. The lease deed was amended in 1970, but no modifications were made to the main provisions. So the Mullaperiyar dam is built in the present State of Kerala but, maintained and operated by the State of Tamil Nadu and this has led to hostility between the two states. This nascent conflict surfaced when leaks were detected in the dam. As a result of growing water scarcity over the years both states have now taken up non-negotiable positions.

Post-independence, the Interstate Water Disputes Tribunal (set up by the Parliament in 1956) handles all interstate water disputes in India. However, as the dispute over Mullaperiyar does not involve resource sharing nor does it involve interstate rights over the river the Tribunal has not intervened. As the conflict is politically volatile, the major institutional players involved in the conflict resolution have been the two state governments represented by their Chief Ministers and departments in charge of water resource distribution and management. As water is a state issue and in the recent years the governments of the two states were composed of different political parties, the interstate efforts at resolving the dispute failed miserably.Moreover, the suggestions put forth by one state were not acceptable to the other as the technical committees setup by the respective states could not arrive at a consensus.

Since all attempts to resolve the issue bilaterally failed, parties were forced to approach the court. It is the Supreme Court of India (SC) which has played an active role in directing the path of the dispute over the years. Though it is unfortunate that the only platform where these various aspects of the conflict were discovered was during the highly restricted trial process in the SC, but it has paved the way for exploring other possibilities. It was under the direction of SC that the Centre was forced to act as a mediator in the conflict. Expert and Empowered Committees also brought to the forefront the environmental concerns, right over resources, possibility of a new dam, injustices of the 1886 treaty and purview of Interstate Water Disputes Tribunal etc.

The Ministry of Water Resources (MoWR), which is the central body responsible for the coordination, negotiation and facilitation of disputes involving inter-state rivers, was given direct

orders by the Supreme Court of India to try to resolve the conflict. However, as the Mullaperiyar is not an interstate river and the conflict does not involve sharing of waters between the two states, MoWR was not keen on being actively involved in the matter. Unenthusiastic attempts of MoWR coupled with influences from coalition politics in the Centre led to the failure of negotiations which just proved to be delaying tactics before the SC could be approached again. The Central Water Commission (CWC) functioning under the MoWR, which is the entrusted body to advise the Government of India (GoI) regarding rights and disputes between different States related to river valley development has had a more proactive role in the conflict, as it is also responsible for conducting studies on dam safety aspects for the existing and future dams. The CWC-led Expert Committee recommended strengthening of the dam wall in the mid 90's. Subsequently, the CWC, deemed to be an authority on dam safety in the country, declared the Mullaperiyar dam safe to store waters up to 142 ft. and shortly thereafter, raised it to 152 ft. The 2006 SC order was also based on the CWC Expert Committee report.

The Government of Kerala was not convinced with the CWC assessment report and ordered independent studies to be conducted. Studies related to hydrological and seismic safety of the Mullaperiyar dam were conducted by organisations like the Indian Institute of Technology (IIT), Delhi and IIT-Roorkee and Indian Institute of Science (IISC), Bangalore and found to be in conflict with the CWC findings. The core of the current argument is regarding dam safety which is based on technical evaluations and when the decisions taken are based on contested technical evaluations the situation becomes more complicated and sometimes irresolvable. Extensive political involvement with rigid vision and the non-intervention of the stakeholders in the decision making process fed by incomplete and distorted information and political propaganda, have led to growing resentment among the public on both sides. The raging legal battles are also becoming time-consuming and expensive for both the states' exchequers.

There have been efforts on the part of civil society such as River Research Centre in Kerala and Forum for Policy dialogue on Water Conflicts in India to initiate multi-stakeholder dialogues in the case of the Mullaperiyar conflict (Forum for Policy dialogue on Water Conflicts in India, 2009). Various socio-political actors and groups e.g. the farmers' organizations in Tamil Nadu and some NGOs in spearheading the protest movement in Kerala have tried to participate in resolving the conflict at various points of time. The legal battle though not very successful has brought to the forefront possible options that can lead to innovative and long term solution to the Mullaperiyar conflict. Since the failure of the 2006 SC judgment, the Government of Kerala proposed a new dam. Demand management which would reduce dependence on Mullaperiyar has also been put forth. According to the scientific community, adoption of ecosystem-based approaches to river basin management, which takes into account the rising water scarcity and all the environmental concerns, is required in order arrive at a long-term solution (Forum for Policy dialogue on Water Conflicts in India. 2011). However, what is imperative is the need to first collect and document all the implicit issues of the conflict and divergent points of view and discuss these in public forums. Secondly, independent technical studies should be carried out to

verify the claims and charges of both the states and thirdly, an open discussion should be held on the Periyar Lease Deed and its amendments.

CONCLUSION

There are several government organisations at Central and State level, with overlapping and competing jurisdictions responsible for water management in India. Centralised water management system often generates conflicting objectives and leads to competing claims. Such competing claims often aggravate disputes, especially when management decisions are formulated without adequate involvement of the local communities and water users. The National Water Policy 2002 proposed the establishment of an appropriate river basin organisation to aid in the planning, development and management of river basins as a whole. This would ensure that the available water resources are put to optimal usewith regard to existing agreements/ awards (GoI, 2002). For trans-boundary collaboration to be successful, however, comprehensive institutions with overarching power relations should be developed. These institutions, involved in the management of river basins, would then be able to prevent conflicts or manage them by defining practices and assigning roles to organisations when grappling with collective problems. However, it has to be kept in mind that institutions are not stand-alone arrangements, but that they operate within economic, political, and social boundaries that often affect the outcome of trans-boundary river basin conflicts.

There is a need to realise that each dam has a socio-economic, political, historical, and geographical context within which it is built. Wherever a major river, lake, or aquifer system is shared by two or more states, decision makers and managers face a challenge of achieving equitable and sustainable use of the water resource. However, in the case of the Mullaperiyar conflict where the management and utilisation of water is by one State and the burden of risk completely falls on the other, 'hydro-political cooperation' becomes increasingly critical for enabling rigorous scientific inquiry and analysis into the eminent risks. The conflict raging over the Mullaperiyar dam brings into focus the need for inclusive river basin management framework for water management and conflict resolution, as inter-basin conflicts are overlaid with various boundaries of interest – spatial, temporal and institutional that pose grave challenges to simplistic conceptions of river basin management. It has been pointed out that the planning and management of basin water allocation and uses are embedded in a broader political context where numerous non-water issues are at work (Venot *et al*., 2011). These include the political expediencies and incumbencies that influence decisions on water resource development, the trajectory of conflicts and to a large extent, the resolution mechanisms relied upon. In the case of inter-basin diversions, where two or more basins are linked through water transfers, these boundaries become even more complex and intractable (Joy et al., 2007).

In the Mullaperiyar conflict, besides the intense political tussles, historical usage of the resource of one basin by another basin without riparian rights, notions of 'surplus' and 'deficit' resource

endowments in the basins involved and deep distrust of stated intentions on either side have etched their own flowpaths of conflict. It is a classic situation where the conflicts over the resource go way beyond the river basin boundaries to become the statement of state sentiments. It therefore becomes important to reconcile river basin imperatives to these wider interest boundaries that are created through inter-basin water transfers and the inevitable linking of the basins involved. Pani (2010) had observed that a multi-dimensional and inclusive approach which recognizes the divergence between the basin and the non-basin areas that utilize the waters is required to resolve inter-state river water disputes. The entirety of the challenges that make up the Mullaperiyar issue can be envisioned only within an inclusive concept of river basin from a historical perspective that recognizes the irrefutable interconnections between the basins that have increased the basin water demands and the wider boundaries of disparate state and political interests that would always influence basin based decisions. The Mullaperiyar conflict forewarns us of the immense challenge to river basin based management posed by the proposed 'Interlinking of Rivers of India' scheme in which large scale river water transfers are planned from various 'surplus' to 'deficit' river basins across India.

The failure of the resolution mechanisms accessed until now in the Mullaperiyar conflict, indicates that newer options need to be tried out with informed multi-stakeholder participation. The conflict is also an opportune vantage point to view the river basin as a possible framework for water resource management and conflict resolution. In basins which have been linked through water diversions, the hydrological unit of the river basin will have to be considered in conjunction with the extended boundaries of water transfer also in order to capture the entirety of the challenges involved. Only an inclusive framework of river basins would facilitate a mutually acceptable management plan based on an understanding of the ecological and power differences between the donor Periyar and recipient Vaigai basins which had in fact initiated the transfer, the completely different notions and priorities on water as a resource and as a sentiment that exists in the arid basin of Vaigai and the monsoon drenched basin of Periyar and the politics of the deeply ingrained notion of 'surplus' waters in these monsoon-fed west-flowing rivers of the Western Ghats. The rapid exhaustion of river basin resources in the light of the ever increasing pressure on water in the country which is the inherent reason behind all water related conflicts signals the urgent need to develop a framework which can renegotiate intractable positions in the interest of the river and riparian populations from a vulnerability perspective. A lack of such a framework increases the hydro-political vulnerability of the Mullaperiyar dam as each fresh instance of seismic turbulence and heavy rain in the catchment area could trigger conflict.

To formulate conflict resolutions revolving around hydro-political vulnerabilities, promotion and dissemination of assessed information is required to enable policy makers to take informed decisions and facilitate greater cooperation across the diverse social, political and economic boundaries that characterise India. A thorough Social and Environmental Impact Assessment and review of public security aspects of all large dams are necessary to assess vulnerabilities.

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