Editors
N. Shantha Mohan
Sailen Routray

SHARING BLUE GOLD

Locating water conflicts in India

NATIONAL INSTITUTE OF ADVANCED STUDIES
Bangalore, India

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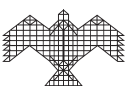

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Preface

Framing the discussion

An increasingly voluminous literature suggests that conflicts around water – blue gold - will be recurrent in the future, both in India and across the world, because of its increasing scarcity. This literature also suggests that there will be conflicts between regions and countries for water as a result of population growth and increasing demands made on water due to rapid economic development. There are many types of conflicts that take place surrounding water that are not interstate conflicts. A focus on administrative boundaries leads us to a process of occlusion where other kinds of water conflicts get less visibility. Inter-sectoral water conflicts, and conflicts between communities of different kinds often arise not only due to scarcity; these also arise due to a host of other interrelated reasons. In India such conflicts take place between industrial and agricultural demands over the waters of dams, between urban and rural/peri-urban areas, and between competing castes over village tanks. These also take place around competing water needs, such as, between water for humans and for environmental flows, and between power generation and irrigation (Mohan *et al.* 2010a).

In the last three decades the Indian state is increasingly perceived as a less than legitimate actor as a water manager. Neo-communitarians and neoliberals who stem from mutually opposing theoretical traditions have similar positions in their criticisms of the role of the state in water management in particular, and in resource management in general. Despite these critiques, the state has an important role to play in passing relevant legislation, in creating institutions for participatory water management, and for creating appropriate frameworks to facilitate the work of market-based mechanisms, even if its traditional role as a developer and investor in water resources management is denied. Most academic work on water conflicts in India has narrow thematic and sectoral foci. This work has traditionally been framed within the disciplines of hydrology, water resources engineering, and economics. But the study of water needs to be done in a multidisciplinary fashion, and

insights from disciplines such as political science, legal studies, social anthropology, geography, sociology, *etc.* need to be used in an eclectic manner (Mohan *et al.* 2010a; Routray 2010).

This edited volume has to be located in this context. It is primarily the result of a two-day consultation organised at NIAS by the institute's 'Water Programme' on 15th and 16th of March in 2010 to bring academics and practitioners from India with a variety of disciplinary and regional backgrounds together to discuss various aspects of interstate and inter-sectoral sharing and conflicts surrounding water. The participants were from a variety of disciplines and academic backgrounds, and included NGOs, academics from various social sciences disciplines, and legal and public policy experts. One of the main objectives of the consultation was to understand the issues surrounding intersectoral and interstate water sharing and conflicts (and their possible relationships) from a multidisciplinary perspective (Mohan *et al*. 2010a).

To put it in context, this book is a companion volume of the book titled 'River water sharing: transboundary conflict and cooperation in India' (edited by N. Shantha Mohan, Sailen Routray, and N. Shashi Kumar, and published by Routledge in the year 2010) that came out as an output of another consultation by the Water Programme at NIAS. This consultation organised on the topic 'Interstate Transboundary Water Sharing in India', was held on 26–27 June 2007 at NIAS, and was supported by Global Water Partnership, Stockholm. The book that came out of this consultation tried to foreground the necessity of deploying multidisciplinary approaches to evolve more comprehensive and integrated understandings of interstate water sharing, and the issues and problems that both states and other stakeholders have to address to resolve conflicts at the basin level. The chapters included in that volume helped to locate the issues, concerns and debates surrounding transboundary water sharing and conflicts within discussions on the water sector in India. They also analysed the relevant issues from multiple perspectives including institutional, legal, historical, cultural, and technological viewpoints. This volume also puts across possible mechanisms for addressing and solving problems related to interstate water conflicts (Mohan *et al*. 2010b; ix-x).

The chapters contained in the present edited volume try to take the concerns and issues raised in the previous volume forward by opening up the frame of discussions surrounding water conflicts. While the previous volume concentrated primarily on interstate/transboundary conflicts, the present one discusses both interstate and intersectoral water conflicts of various kinds. It also brings perspectives from across India by featuring conflicts from states as different from each other as Kerala, Odisha, Maharashtra, Andhra Pradesh, Tamil Nadu, and Himachal Pradesh. These contributions are problem-driven rather than literature-driven. We hope that the papers contained in this edited volume (brief discussions of which follows this section) will help pluralise the discussions surrounding water conflicts in India.

Chapter summaries

In the first chapter of the book titled 'Water as an ethic: three ways of talking about water, rights, and conflicts' authors Sailen Routray and N. Shantha Mohan argue that the discourse surrounding water in India (and perhaps in much of the world) is now framed surrounding the twin concerns of efficiency and equity. This paper provides a very brief overview of the literature surrounding water and rights, and argues that one needs to look at rights and duties with respect to water in India in a holistic manner to be able relate to water as a resource in a manner that is socially just and environmentally sustainable.

The second chapter of this book by Varun Sharma, 'Water, caste and power in drought-prone Andhra Pradesh' takes these concerns surrounding water rights and ethics forward by tracing the links between denial of water rights and jāti/caste dynamics in Andhra Pradesh. In this chapter the author describes the imbrications between water, caste and power in drought-prone areas of Anantapur, Chittoor and Cuddapah districts of the state. The tanks on which irrigation is based in the study village, and in the surrounding areas, have multitudinous user regimes, with contestations around each site. Irrigation organisation and resource use are linked with politics and caste. The author illustrates this by detailing the resource use dynamics of a few tanks. He demonstrates that long spread out electoral cycles

are imbricated with seasonal availabilities of water; this in turn determines resource appropriation. Conflicts around the tanks' resources, such as irrigation water, fisheries and NTFP, take place within a political-ecological matrix. In this matrix, seasonality and scarcity figure along one axis and caste dynamics and electoral politics lie along the other. This chapter draws our attention to the ways in which collective action is refracted through the instrumentality of modern tools of resource management such as leases, and the manipulable nature of traditional arrangements.

In the third chapter titled 'Interstate water allocations, dams and conflicts', authors K. J. Joy and Suhas Paranjape argue that interstate water allocations have been a contentious issue in India. This process has often led to conflicts amongst the upper and lower riparian states. This chapter considers a few cases of dams (and diversions) as instruments of providing allocated water share to the contending states, and the conflicts attendant with the use of dams for such a purpose. In other words, the paper discusses dams as important links between interstate water allocations and transboundary conflicts. By doing this, the chapter tries to shift the discourse of conflicts around dams from one of submergence and displacement to emerging concerns such as those around dam safety, reservoir operations and impact on the downstream areas with respect to floods, downstream uses, and environmental flows. It takes up the case of three dams that have caused conflicts between riparian and non-riparian states. These three cases being the Sardar Sarovar Project (SSP) on the Narmada River, the Almatti dam on the Krishna River, and the Mullaperiyar dam on the Mullaperiyar River. These three dams bring out some of the important dimensions of transboundary water allocations, contestations and conflicts. The Narmada Water Disputes Tribunal fixed the height of the SSP and foreclosed any alternatives. The authors use discussions around the Almatti dam to bring to the fore concerns surrounding reservoir operations, as this is a source of conflict between the states of Maharashtra and Karnataka following upstream flooding in 2005. The Mullaperiyar dam brings to the foreground the important issue of dam safety faced by the people of the state of Kerala, and the resultant conflict between the states of Kerala and Tamilnadu. Through the discussions surrounding these cases, this chapter tries to think

through innovative ways to better engage with interstate water allocations and the concomitant conflicts surrounding the use of dams as instruments of delivering these allocations.

In the fourth chapter titled ''Struggle for 'blue gold' in Plachimada, Kerala'' Patibandla Srikant discusses an important case of people of Plachimada in Kerala fighting a big multinational corporation over water and winning. The people of Plachimada struggled against the depletion of groundwater resources and pollution due to a Coca Cola plant in their area. They struggled and asserted their traditional community rights over groundwater although these were not acknowledged under formal legal frameworks. The author frames the struggle in Plachimada as about people going beyond the logics of the state to assert the need to continue with their livelihoods patterns. The movement that rose against the Coca Cola plant organised the people of Plachimada and nearby villages by highlighting the negative impacts of the plant on both groundwater and livelihoods of people. The success of the movement can be seen as an instance of one conceptualisation of rights over water, that of 'traditional community rights', coming into conflict with the legal, state-given rights of a corporation to extract groundwater from the land it has formal rights over, and the 'traditional' conceptions winning. In this, the local people were helped by regional, national and international solidarity expressed for the movement.

Unlike the fourth chapter that frames water conflicts within tradition vs. modernity and community vs. corporate debates, the fifth chapter titled 'Unequal power, unequal contracts and unexplained conflicts: facilitating negotiations over water conflicts in peri-urban catchments' by S. Janakarajan takes a more spatial approach to locate water conflicts. This chapter discusses the severe problems surrounding water faced by Chennai city in Tamil Nadu state and the surrounding peri-urban regions. The author argues that these problems are a result of poor strategic management, inadequate infrastructure, rapidly growing demand for water and ineffective implementation of legislations for the regulation of use of water resources. He posits that the institutional architecture for water management in the city is fragmented, resulting in very poor alignment of

plans, programmes, policies and projects, and focusing only on supply-side measures has resulted in poor results of investments in major infrastructural projects. Access and entitlements to water in peri-urban areas have decreased, facilitating transfer of water to core urban areas. Institutions in the peri-urban areas are weak, and people living in these areas are powerless to stop this process of resource transfer that is destroying their livelihoods. This chapter argues that an integrated approach to urban water service delivery and planning is needed that puts needs of peri-urban areas at the centre of our concerns. As the city of Chennai expands, tanks earlier used for irrigation can help us meet the city's water needs. The author suggests that urban planners and administrators should view urban and peri-urban areas as part of the same ecosystem, and, should protect the tanks around Chennai. He argues that this objective can be achieved by combining developmental and ecological perspectives to make integrated water resource management more meaningful.

In the chapter titled 'Contentions over the Mullaperiyar and implications for river basin management' by C.G. Madhusoodhanan *et al*. take the discussions of Joy and Paranjape in the third chapter forward by discussing in detail the case of the conflict surrounding the Mullaperiyar dam. The Mullaperiyar project has been the source of intense contention between the states of Kerala and Tamil Nadu ever since major leaks were detected in the dam following which the water level in the reservoir was brought down to 136 feet from 152 feet. Over the years, the two states have been involved in a tussle over the issue of raising the water level back and related safety concerns which hold within it other implicit and deeper disquiets that have protracted and aggravated the conflict. The failure of conflict resolution mechanisms accessed until now points towards the need for an informed public debate through the collection, documentation and public dissemination of the existing documents on the subject, independent technical studies to verify the claims and charges of both the states, and an open discussion on the Periyar Lease Deed and its amendments, to lead towards the framework for a new agreement that would address the grievances and insecurities of both the states. The conflict also brings to light the potentials and practical challenges involved in the implementation of river basin management in basins that have been linked through inter-basin diversions. The

rapid exhaustion of water resources in the country which is the inherent rationale behind all water related conflicts signals the urgent need to evolve a framework which can help renegotiate recalcitrant stands in the ultimate interest of the river from a sustainable perspective.

In the seventh chapter, authors Arti Gupta and Romesh Chander deal with competing claims over water in the fragile and marginal areas of Kullu district in Himachal Pradesh. This chapter discusses Kullu as a transitional zone between the lower and the greater Himalayas with the Beas River dominating the district. It discusses the climate and cropping patterns of the district. The authors argue that the land and resource use system in the district, till very recently, used to be an integrated system of interdependent forests, pastures and farms. Due to the growing impacts of tourism, a rash of hydroelectric projects, growth of cement plants and mining, there are rapid changes in resource use patterns and the demands being made on the water resources of the district, and not much thought is being given to maintain environmental flows in the district's rivers. The authors posit that there is bound to be ecological degradation in the future that will result in conflicts if the present model of development continues without abatement.

In the eighth chapter titled 'Legal aspects regarding water sharing, in relation to climate change concerns', author Anil D. Mohile posits that, water conflicts arise because of divergent ideas about 'ownership' of water. The author further argues that water is a common pool resource, and its use at any place in a basin affects its use in all other parts of the basin; this calls for basin-level water use planning. This chapter discusses three mechanisms for allocating water available in a basin in India; these three being agreements, arbitration and adjudication. The author then notes that there is no international law on water, and discusses various frameworks and rules such as the Helsinki Rules that frame international water governance. He also discusses the legal framework for locating interstate river water sharing in India. After discussing the various scenarios of climate change, in India, including precipitation, its variability, water demands, *etc*. the author says that the net effect of climate change is not clear. The author is of the opinion that water allocations made, and water-related disputes that have already been resolved, may

come under stress in the future due to uncertainties induced by climate change.

Tapan Padhi, in the ninth chapter, titled 'Reflections on the politics of conflicts over Hirakud waters', picks up an arguably classic case of intersectoral conflict over water – that of the competing claims of irrigation and industrial usage over the waters of Hirakud dam on River Mahanadi. This chapter discusses the growing intersectoral conflict between agriculture and industry surrounding the waters of Hirakud. This dam was planned as a multipurpose dam for flood control in the delta of River Mahanadi, for irrigation in the middle reaches, and for power generation. The author foregrounds the fact that seeds of conflict were sown in this planning process itself that put mutually contradictory aims as the goal of the project. The region around the Hirakud dam is rich in minerals and industrialisation around the dam has accelerated after the 1990s. He discusses how with new industry-friendly policies, and major road development activities, industrialisation has started taking place at a fast pace with industries making increasing claims on the water of Hirakud. For the time being though, there is enough water for everyone. But unregulated extraction of water from Hirakud by some industries has stoked the fears of farmers, and there is a growing and vocal movement by farmers' organisations against the supply of the dam's water to industries. The author argues that in this process of protest what is missing is the voice of the tail-end and marginal farmers. He argues that there is a need to question the very basis of big dams as a source of agricultural development. He posits that better command area management might be a good interim measure to increase the total availability of water in the Hirakud dam.

In the tenth chapter titled, 'Self help groups (SHGs): a medium of water conflict resolution' authors Hippu Salk Kristle Nathan and Jayashree V. argue for using SHGs as a conflict resolution mechanism in water-related disputes. SHGs are an increasingly important public policy tool for women's empowerment. They argue that these can be used for effective water management and conflict resolution as well. Since women are managers of most water-related needs of households, the authors argue that by building the capacity of SHGs, their power can be harnessed to improve health and sanitation, and

to enhance access to water in water-stressed areas. For the purpose of conflict resolution of water-related conflicts, this paper discusses the importance of building a cadre of water negotiators from enthusiastic SHG members by training them in managerial and legal aspects and involving them in water management in villages, and in slums in urban areas. They posit that making these women water negotiators a part of local and regional water management processes will help planners and water administrators to pragmatically resolve water conflicts.

Smita Mishra-Panda takes these concerns related to gender issues forward in the eleventh chapter titled 'Water related conflicts and gender equity: beyond rhetoric'. This chapter discusses the gender mainstreaming literature in water management. It summarises and critiques a set of manuals on gender mainstreaming in the management of water resources. She argues that women are important users of water at the household level. Also as unacknowledged economic actors as invisible farmers, their voices are often not heard in policy and planning discussions surrounding water. But the gender mainstreaming literature often misses out in providing practical road maps for the transformations that these envisage. By discussing the case of SEWA in facilitating women's participation in water management, the author argues that the transformations in gender relations are at the level of the collective; they don't percolate down to the level of the household. She feels that this is the case since patriarchy is not challenged collectively, its operations at the household and individual level continue unabated. She then makes a case for evolving concrete ways of incorporating women into processes of water management and resolution of water-related conflicts. The author feels that having a gendered perspective while trying to manage water conflicts might be an important first step in such a process.

K.G. Sreeja and P.K. Shetty take up, in the last chapter, a discussion of another marginal community – that of migrant labourers – ignored in debates and discussions surrounding integrated management of river basins. In their chapter titled 'Invisible people: migrant labourers in the context of Integrated River Basin Management', they claim that the shift from agrarian livelihoods and resource relations has changed the patterns and processes of resource mobilisation bringing in its wake issues

rarely addressed in existing river basin planning frameworks. They argue that though there are numerous studies on migration and its effect on the resources of a region through labour loss and capital gain through remittances, the emerging trends of in-migration into the rural spaces and its resource linkages are inadequately addressed. The extraction and conversion of natural resources of a river basin is found to be predominantly mediated by these migrant workers who remain invisible in the existing frameworks of resource management. The paper pursues the issue of migrant labour in relation to resource mobilisation in the lowland zone of Chalakudy river basin in Central Kerala. The manifold consequences of in-migration on the basin is resource use, demand and conservation, and its implications for Integrated River Basin Management are explored.

As is evident from this brief discussion of the chapters collected in this volume, the authors try and map the contours of conflicts surrounding water in India by pluralising the frames in which such conflicts can be located. They bring in perspectives from multiple vantage points to give us a map of the dynamics behind such conflicts. Some conflicts surrounding water are a legacy of history; some other conflicts stem from inappropriate policies, quite a few arise and do not get resolved due to the lack of appropriate dispute resolution mechanisms, whereas a few others involve stakeholders that stay invisible and need to be visibilised. These papers try to address some of these issues. This book therefore makes an attempt to help take a more nuanced and multi-disciplinary view of water conflicts in India.

We take this opportunity to express our immense gratitude to all those who contributed to the consultation. We thank all the presenters of papers in the consultation and those who contributed chapters to this volume. Our sincere thanks to Prof V.S. Ramamurthy, Former Director, NIAS, for his unstinting support and advice that made the consultation possible. Professor Ramamurthy and Dr. Baldev Raj, the present Director of NIAS, have been the driving force behind this book. We express our appreciation for the help rendered by the faculty, staff and students of NIAS evinced by their valuable contributions at the consultation.

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Water as an ethic: three ways of talking about water, rights, and conflicts

Sailen Routray and N. Shantha Mohan

1. Introduction

We remember growing up in social milieus in which regular access to water was not guaranteed. Till, say, ten years back, growing up in small towns and villages in Karnataka and Odisha meant that even playing with water was a taboo. If a drop of water got split on the floor, or on the dining table, and a child started drawing something with it, immediately she would have been admonished by an elder, especially by the grandparents. This was because of a folk belief that playing with water resulted in droughts was still strong then. The need to conserve water was deeply embedded in the strictures and taboos that governed everyday life.

The links between water and what constitutes ethical social practice in India go very deep. In many of the purānas (histories that are hybrid narratives of genealogies, stories and historical events around people, places, deities and lineages) one of the ways in which the gods punish wayward kings who do not follow the dharma was by visiting droughts upon the kingdoms that they ruled. The corollary to such narratives was the fact that all rulers and kings could hope to increase their powers in the material world, and win merit for the other world by constructing water bodies.

In this context, David Mosse details out the ways in which the creation of water bodies in Ramnad district, exercises of political power, and notions of ethical practice all fed into each other for centuries all together. The creation of tanks was supposed to accrue merit for the rulers of the region. But the creation of such water bodies extended land under paddy cultivation in the area, and increased its human population, and thus, the number of subjects for the rulers as well (Mosse 2003).

Even now when the rise of the developmental state has significantly eroded the autonomy of communities, it is not unusual to come across instances of people constructing and maintaining communal water bodies because of the merit that is supposed to accrue to one because of such charitable acts. Merit or dharma is supposed to accrue to people if they created public water bodies; but there were strictures against polluting water bodies as well. These were also a matter of taboos; urinating, defecating, or polluting rivers and tanks were taboos, and were seen as reprehensible acts.

But the past in India was not completely unproblematic. Water was also a site where caste differences and differentiation were built. The relationship between various jāti groups was mediated through the ritual and symbolic values of water. Generally speaking, in most regions of India, jātis have apparently been ranked according to a gradation imposed by water. Generally speaking (and this is a huge generalisation) a person belonging to a jāti that was less powerful and esteemed could and would accept water from the hands of someone belonging to a more powerful and esteemed jāti and not vice versa. Similarly food cooked in ghee or oil could be eaten by anyone, no matter what its source was. But the acceptance of food cooked in water was subject to strictures similar to the strictures governing that of acceptance of water. Thus, water played, and many would argue, continues to play, an important role in the reproduction of social roles and institutions in India; it might also be said that it is at the center of Indian conceptions of the good life.

But it can be argued that this way of acting upon the world is no longer available to us. Moreover, these ways of acting upon the world, specifically with respect to water, might even be in contradiction with the supreme morality – constitutional morality - that purports to govern our actions in post-independence, republican India. Increasingly access to key resources in India are framed through the discourse of rights; this is true for a resource like water as well. In this, the discussions in India also reflect the international narratives surrounding water rights.

Increasingly the international discourse surrounding water is framed through the trope of war and conflicts (Gleick 1994). The narrative of water conflicts can be seen as a narrative parallel

to that of water rights. Often conflicts are seen as either arising out of poorly defined rights or as a result of conflicting notions of rights – for example, as a result of conflicts between customary rights and property rights. Therefore, a discussion on water rights and water ethics might be relevant to any discussions on water conflicts.

2. Water rights

Increasingly discussions surrounding water and rights have three important strands; the first one has to do with that of property. This discussion, primarily of an economic and public policy persuasion, argues for the necessity of seeing water as an economic good, and sees property rights as one way of ensuring 'proper' transactions related to water. The second strand of discussions happens around rights of states over water, and the 'water wars' discourse dominated this for a while. The third strand of discussions occurs around the 'human right' to water, and the ways in which entitlements to minimum levels of water can be ensured to all, especially for the poor and the underprivileged. In some sense one can see at play the perceived dominance of three sets of socio-political actors in these three strands: the first strand privileges 'the market' and corporations; the second strand foregrounds statist concerns and tends to legitimise the state as the actor par excellence in the water sector; the third strand foregrounds 'people', and 'society'.

Property rights over water

According to the UN agencies water gained recognition as an economic good after the declaration of the Dublin principles in 1992. A large part of the discussion surrounding water and property rights have been around seeing water as an economic good, getting the price right for promoting efficiency, and for ensuring the sustainability of water usage. The discussion surrounding property rights and water in India have been about pricing and cost recovery (Rogers *et al*. 2002). This discussion has had two foci; water for irrigation, and urban drinking water.

Treating water as a public good and its management, especially that of irrigation water, by state agencies, is seen to lead to inefficient usage of water. Market-based mechanisms

are seen as alternatives. There are two broad sets of reasons that are given for preferring water markets over administered pricing. Treating water as a public good, and the consequent administrative delivery, is seen to be captured by interest groups. The governmental administrative bodies are also perceived to be inefficient. The critiques of free-market solutions argue that water markets need significant regulation. Moreover, private property rights over water need enforcement by the government; the need for such enforcement creates problems similar to those involved in treating water as a public good, and the consequent administrated pricing and delivery. Moreover water markets fail regularly. The introduction of private property rights over water, and the consequent markets mechanisms, do not automatically guarantee efficiency. Market-based mechanisms also do not always take into account issues surrounding water equity (Routray 2010).

Recently, there have been a few cases in India where urban municipal bodies have tried to privatise water distribution in cities. The proposed changes to bring in market-based mechanisms in the water sector (in the case of both irrigation water and urban drinking water provisioning) are seen as part of a broader neoliberal trend in governance in India. As Priya Sangameswaran discusses in the case of Maharashtra, urban drinking water, rural drinking water, and irrigation water are increasingly subjected to a greater drive towards private sector participation that changes the discourse of water provisioning by depoliticising the imperatives and practices of governmental organisations. The neoliberal goal of self-sufficiency is propped up as a desirable goal; the questions of feasibility and desirability of this in a sector such as water (especially urban drinking water) is forgotten (Sangameswaran 2009).

We are not arguing that one need not 'get the price right' at every instance. In fact, in the way water usage is charged for urban drinking water and irrigation water, it is the rich farmers and urban middle class and upper-middle class citizens that get most of the benefit. The concerns of the poor and the vulnerable are rarely parts of the policy discourse. The water bills of the rich and the relatively better off need not be subsidised. But rationalisation of subsidies does not need to translate to either fixing property rights over water or to merely 'getting the price

right'. In times of growing agrarian distress and rapid expansion of urban population in India, using arguments of inefficiency of governmental provisioning of water to push for privatisation of water can only be termed as misguided.

States' rights over water

The international conventions, rules and declarations that frame discussions surrounding rights and water, not very unpredictably, foreground states as the legitimate social actors in the sector. These deal with rivers that flow through more than one country. The Helsinki Rules and the UN Convention of 1997 are important in this regard as these provide the principles of sharing transboundary river waters. The Helsinki Rules deal with issues surrounding pollution, navigation, and timber floating *etc*. But the UN Convention of 1997 does not deal with environmental and relevant human rights concerns in an integrated fashion. With respect to transboundary river waters, upper riparian states often claim absolute territorial sovereignty and control over the water within their borders with scant regard of effects on downstream states. Downstream states tend to make claims about the absolute integrity of the watercourses, and demand the non-disturbance of the quantity and quality of water flowing from the upstream states. The Helsinki Rules provide the principle of "equitable utilisation" that recognises the right of riparian states of usage of water from common sources if they do not interfere unreasonably with the usages of other riparian states. It must be evident that Helsinki Rules treat international transboundary rivers and their drainage basins as indivisible hydrologic units, and, these are expected to be managed as a single unit (Mohan 2010).

The Berlin Rules on Water Resources expand the scope of the Helsinki Rules and the UN Convention of 1997. The Berlin Rules enumerate five principles applying to the states related to participatory, conjunctive and integrated management, sustainability, and the minimisation of harm to the environment. The Berlin Rules also posit three additional rules relating to water sharing in an international transboundary context; these are cooperation, equitable utilisation, and the avoidance of harm. As it must be evident from this discussion, states do not have absolute rights over the waters of transboundary water bodies (*ibid*).

In the Indian context, water is listed under Entry 17 of the State List in the Constitution of India. This entry is subjected to the provisions of Entry 56 of the Union List. The latter Entry gives the Central Government powers to legislate on matters related to interstate rivers. But this Entry has not been used to the fullest possible extent. Further Article 262 of the Constitution provides adjudicatory function to the Centre in conflicts related to interstate rivers. The Inter-State Water Disputes Act (ISWD Act) 1956, that provides for the formation of tribunals for settling transboundary river disputes, was promulgated under this Article (Mohan and Routray 2011).

Water as a human right

The discussion in the preceding sub-section showed that international principles, rules and frameworks for water governance as well as the Indian constitution frame issues surrounding water through a statist optic. This neglect of the social aspects of water usage is definitely not unique to these. Academic work on social issues related to water has generally dealt with issues of efficiency and sustainability. Comparatively speaking, less attention has been given to issues surrounding equity (Routray 2010).

In this regard there is an increasing move to argue for a human right to water that tries to take into account these concerns of equity. Scholars argue that from an individual's perspective there are clear advantages to having human rights over water. The social benefits of recognising such a right are perceived to be significant. The question is whether such a human right to water should be a right subordinate to other human rights such as right to health and right to life (as recognised by the international bill on human rights) or should it have an independent recognition. In either case, institution of a human right to water will have far reaching consequences. There are difficulties associated with the fragmentation of the right to water. Thus, the Committee on Economic, Cultural and Social Rights of the United Nations Economic and Social Council (ECOSOC) has taken a non-fragmented and holistic approach in order to ensure the required water supplies to realise the rights under The International Covenant on Economic, Social and Cultural Rights (ICESCR). This can be seen from the ECOSOC's General Comment 15 in

November 2002; this note recognised the right to water as an independent human right. This Comment is non-binding, and does not spell out the obligations of the States to ensure the human right to water. But it is significant as it provides the basis for an independent human right to water (Bluemel 2005).

A human right to water would entail obligations to respect, protect and fulfill. This will involve ensuring access to water with a specified quantity and quality in a non-discriminatory fashion. Ensuring water rights might be difficult because attempts at ensuring one community's rights might violate another's; big dams are a good example of this. There are further choices to be made between the right to water, and the right to development. This is an important set of choices to be made, since industry is amongst the biggest polluters of fresh water sources, and cleaning up pollution by shutting down, relocating or adapting to cleaner technologies will have developmental costs. From the perspective of the states, such an approach is seen to put constraints over adequate cost recovery. These costs are perceived not as merely financial, but as legal, cultural and institutional ones as well. These costs will vary according to socio-economic, cultural, and political contexts of specific countries. South Africa has already enshrined the human right to water as a part of the country's constitution, and has started taking steps to ensure the enjoyment of such a right by the country's citizens. Argentina also has an explicitly stated right to water in its constitution, and has taken steps within its court system to protect this right (*ibid*).

Ensuring the human right to water: the Indian case

In India a quantum of 150 lpcd and 200 lpcd of water has been put forth by the NCIWRDP in the rural and urban areas respectively; a common norm of 100lpcd is seen as sufficient for both (Iyer 2007). In India's constitution, the right to water is not stated explicitly; but this right is implicit in the constitutional right to life that has been interpreted by Indian courts to include a right to clean and sufficient water. The right to water has been derived by the courts in India from Article 21 of the Constitution that provides for the right to life. The right to water in India has evolved through judicial interpretation, and not through legislative action. This is evident in the judgments being passed by the judiciary in cases such as *Narmada Bachao Andolan v. Union*

of India, *M.C. Mehta v. Union of India* and *A.P. Pollution Control Board v. Prof. M.V. Nayadu*. In these cases the Supreme Court has passed injunctions upholding the state's duty not to pollute water resources, to prevent potential pollution of drinking water during industrial development, to improve the sewage system, and, to provide clean drinking water to all its citizens. The Supreme Court of India has also declared groundwater to be a public asset (Narain 2010)

Questions surrounding water rights in India are also issues about access. In large parts of rural India caste-based barriers to accessing water, especially drinking water, are still prevalent. There are laws that try to deal with this situation; for example, s.3 (xiii) of the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989 deals with problems of scheduled caste and scheduled tribe communities with respect to access to water, and makes it a punishable offence for persons belonging to non-ST/SC communities to either obstruct usage of sources of water by SCs and STs, or to spoil such sources of water. It must be mentioned in this regard, that traditional managers of water bodies in the commons (such as tanks), especially in peninsular India, often belonged to the SC communities. But irrigation laws in Andhra Pradesh and Tamil Nadu do not acknowledge the roles of such traditional water managers and their rights. With regard to other uses of water such as those by traditional fisher folk, the changed polices of the state often affect them adversely. As this shows, governmental policies are often inconsistent with the constitutionally given and judicially interpreted right to water. The need to adequately operationalise such a right stems not merely from constitutional and juridical imperatives, but also from such international imperatives as the Millennium Development Goals, and the obligations under General Comment No. 15 (Muralidhar 2006).

3. Water as an ethic

In contrast to seeing water as a right we posit that there is a need to frame discussions surrounding water and equity in terms of an ethic. This is important in the context of India where rights, especially property rights, add to the potential for conflicts embedded in situations of water sharing. Water as a resource itself comprises of an ethic. Unlike other 'static' resources such

as land and minerals, water is dynamic. It is also renewable, and this characteristic of water makes physical exercise of a 'right' – in the sense of excluding other potential users - difficult. Because as a resource water can be used multiple times for multiple usages, it can lend itself as much a site for conflict as for cooperation.

In this regard, instead of figuring out details of what will be the legal, economic and institutional repercussions of constituting water as an ethic, we here list out a few principles that may help in taking the discussion on water, equity and rights forward. These are based on the understanding that duties and rights are intertwined; every right, as we learnt as students in school, has a corresponding duty. The peculiar nature of water makes the fulfillment of these duties an imperative. Water is essential for life, and is the basis for obtaining other capabilities such as food and health that are necessary for human wellbeing. Hence, discussions surrounding water and equity have to go beyond the narrow and legalistic calculation of rights and duties; a discussion of water as an ethic has to frame these debates.

The first principle that has to be kept in mind while discussing about water and equity, and, therefore, about water as an ethic is that of ideological pragmatism. As seen in the earlier sections of this essay, discussions surrounding water and rights are often framed around ideological positions that seem to foreground states, or markets, or communities as custodians par excellence of water as a resource. One needs to get away from this kind of ideological polarisation with respect to water. In some instances, for example, in densely populated urban areas, provisioning by governmental organisation might make sense, whereas facilitation of community provisioning of drinking water supplies might be more relevant in thinly populated rural areas. Major subsidisation of domestic water usage of poor urban citizens might be necessary whereas rich rural farmers undertaking cash crop cultivation might deserve minor or no subsidy support.

The second principle to be kept in mind is that of subsidiarity. If water can be provisioned at a lower scale of administration or community, then that should be encouraged. This also means that the responsibility is on organisations on a higher level to follow rules such as no-harm to the resource.

The third principle that has to frame discussions surrounding water as an ethic is a Gandhian one – it is the principle of *antyodaya* (roughly translated it means putting the last, or the weakest, at the first). With respect to water, in practice, it will mean that in the event of any conflict with respect to claims or access to water as a resource, the claims and concerns of the weaker party in a dispute should be foregrounded.

The fourth principle that has to fame discussions surrounding water is the indivisibility of water as a resource and the way it can work as an integrative device in thinking about issues surrounding development and equity. Current processes of development violate the 'bodies' of sources of freshwater such as rivers, tanks and lakes with impunity. Socio-economic planning and its implementation takes place in India as if water and water bodies are incidental to such a process. Especially with respect to urban water resources, city planning has to take place as if water mattered. It will help us think and act about issues of inequity in other resources such as land and forests in a much more integrated fashion.

4. Steps to be taken

If we see water as an ethic, then one cannot merely hand out a set of prescriptions that are context-independent. But certain broad directions in which things need to start moving soon can be indicated. One needs to identify a minimum quantum of water (for drinking, cooking, sanitation, and health) that is an entitlement of every person on account of being a citizen of India. Because of obvious reasons, this will need to be minimally defined, and governmental agencies responsible for ensuring supply and access of this water will need to be identified. Instead of targeting the vulnerable, the attempt should be to ensure universal access to this quantum of water. A code will also be needed to be developed for governmental organisations for dealing with pollution of fresh water sources. Similarly, corporate liability will need to be defined banning usages of certain types of common resources of surface and groundwater for commercial purposes. A place has to be created for civil society organisations so that they can act as catalysts for desirable change for ensuring the right to water, for watching over the activities of government

organisations and corporations, and for playing a pedagogic role with respect to the wider public (Muralidhar 2006).

5. Conclusion

There was an older ethic of water that governed the usage of the resource in India informed by a certain understanding of Dharma. Under the constitutional morality that is supposed to guide resource use in postcolonial India that ethic is not available to us any longer. The discourse that is available to us is one of rights. As we saw in this essay, there are three important ways of thinking about water and rights in the world as well as in India. These three are – private property rights over water and issues surrounding cost-recovery; rights of states over water according international laws and conventions and the possibilities of cooperation and conflict between states based on these rights; and the third being around the human right to water. This essay is most comfortable with the third way of talking about rights. While recognising a human right to water it is necessary to start thinking about water in new ways. Thinking about water as an ethic, and the principles that can govern such an ethic, might be one such way in which we can perhaps start thinking about water, equity, and rights productively. This will also help us to prevent water conflicts, and to be able to deal with them in more effective ways.

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Water, caste and power in drought-prone Andhra Pradesh

Varun Sharma

1. Introduction

A chance encounter with a potter, collecting sand from one corner of a silted water body in Chittoor district, indicated to me early on that relations between caste and water are not clear, and they cannot be interpreted simplistically. Speaking specifically of village tanks in the drought-prone districts of southern Andhra Pradesh, these have witnessed a multitude of changes from the medieval period in which they were constructed. With a water spread of rarely less than a hectare, and attendant rich socio-cultural history, the village tanks or *cheruvu* as they are known in *Telegu*, have seen their catchments pass to the cultivation of groundnuts, and their command area to the dominance of hybrid varieties of rice. On account of the increased demands for fodder, the waterbeds of such tanks are now increasingly sought for the promotion of cultivation of fodder varieties. And owing to a depleting forest base, the shrubs and trees beside the tanks are increasingly sought to meet fuel-wood and fibre requirements of local villagers. But in speaking of water, caste and power in simultaneity, the potter Venkatramana's claim rang aloud: "… when you lean over the waters of a village tank, it is not just your own reflection that you catch, but the entire village politics". All such reasons, namely the changing ecological and economic conditions, bourgeoning livelihoods and new opportunities, the formation of parallel bodies in the nature of Water Users Associations (WUAs), a bureaucracy deeply entrenched in the rural milieu, and the penetrating influence of factional politics on water distribution / management, necessitate an appraisal of the undying, regional imbrications between caste, water and power.

Louis Dumont (1970) in speaking of power and territory had indicated as to how caste is contained within a spatial framework (Dumont 1970; p.152). But experience goes to prove that the phenomena of caste, as opposed to being confined to a spatial framework, occurs more so within a resource framework

(the intention is not to negate 'space', but only to broaden our imagination of it). Wherever resources are scarce, as is water in the context of drought-prone Andhra Pradesh, contestations and interactions over it are volatile and dense. User groups are formed on the basis of strong caste, sub-caste and bureaucratic affiliations, each acting as a cluster that vies and contests for its "right over water"—*niti paina hakku*, as it is said in the vernacular. The present paper seeks to summarise and present a few narratives of the village tanks in the drought-prone districts of Anantapur, Chittoor and Cuddapah. It further elaborates that if "territorial segmentation" is necessarily a correlate of a rigid caste system (as Hutton spoke of in early 1946) then caste-based land holdings under the catchment area of village tanks (as expressions of a territorial segmentation) are equally representative of the access enjoyed by castes to the water of the tanks and their resources such as fish produce and NTFP. This makes it even more essential to locate the workings of caste, and that of dominance, as M.N. Srinivas (1962, 1966) has previously elaborated for us, within a resource framework (of which land is an essential, but singular element).

By locating caste in a resource framework, one finds that the patterns of territorial segmentation and water distribution, spoken in so far with specific reference to agriculture in the *ayacut* (*i.e.* the command area), extends itself to 'other' resources supported by the water of a village tank. 'Other uses' is an interesting category that presents itself, every now and then, in a working paper, a government document, or even a scientific study. But should we, after all, call them 'the other'? Such 'other' uses include fresh water fisheries, revenue from sale of Non Timber Forest Produce (NTFP), fuel wood, fodder and water for livestock, slush for brick making, and even potable water for domestic use. As far as the asymmetries of caste and gender are concerned (Dube 1996), it reflects in water as well. A number of 'lower-caste' women who rely on the village tanks for washing, cleaning, and bathing *etc.*, are invisibilised. Water is controlled and managed in ways that negate the dependence of women, more so 'lower-caste' women on the water of village water bodies. In this sense the abundance of literature that confines itself to the practice of agriculture, and assesses the success of rehabilitation programmes singularly in terms of crop yields for the land holders, overlooks the critical dependence of other marginalised groups such as livestock

herders, fisher folk and washer folk; needless to say, all such groups comprise of members of the 'lower castes' who rarely hold land under a village tank. Owing to the erroneous imagination of water resources such as village tanks as 'single-use irrigation units', as opposed to their multiple-use reality (Koppen *et al*. 2006; Shah and Raju 2002) they have been "repaired", "developed", "rehabilitated" and "managed", in that very order, under different schemes and programmes in Andhra Pradesh, with the primacy of optimising the dominant use of agriculture in the *ayacut*. In the process, the interrelationship between castes, diverse resource uses (of which agriculture is only one), and dominance has been obfuscated or even derided.

Thus, it is the intention of the present paper to elicit conflicts over water at the grassroots to further describe the complexity of interactions, both within and across castes and user groups, as relating to a village tank. The twin objectives of the paper can, therefore, be summarised as capturing the complexity of interactions across different use/user regimes, and furthermore, presenting the politics and contestation that very often ensue between different castes and uses within the drought-prone context of Andhra Pradesh by relying on a multiple-use perspective. Multiple-use is imbricated in caste conflicts surrounding water as different castes have different and competing uses for water.

The present paper primarily comprises of observations that were made as part of a study undertaken while the author was with the Foundation for Ecological Security (FES), Anand. The study was supported by the International Water Management Institute (IWMI), Hyderabad. Ten village tanks in the districts of Anantapur, Chittoor and Cuddapah were covered as part of the study. Though the above study was carried out in the first half of 2008, many of the facts and figures, especially those pertaining to the dimension of politics and caste, were collected in an individual capacity after the formal closure of the study. The study was largely qualitative in design, relying on PRA exercises, interviews with key respondents from different user groups, and focus group discussions (FGDs). The main findings of the study are presented in five parts in this paper. Part I elaborates the context of the area, Part II looks at the plurality of caste-water regimes under a village tank, Part III sequentially

Table 1: Village-wise Demography

Sl.	District	Mandal / block	Revenue village	SC%	ST%	1. Name of village tank	Command area or *ayacut* (acres)
1.	Chittoor	Mudivedu	Picchalavandlapalle	8	2.8	Appalama cheruvu	147
2.	Chittoor	Thambalapalle	Gundlapalle	5.5	4.5	Chennarayanswami cheruvu	110
3.	Chittoor	Thambalapalle	Kotala	13.9	15.3	Kotala cheruvu	207
4.	Chittoor	Kalicherla	Bandrevu	7.2	28.7	Bandrevu cheruvu	115
5.	Anantapur	Kadiri town	Kadiri Rural	4.8	4.8	Vittalarayani cheruvu	79.10
6.	Anantapur	N.P. Kunta	Dhaniyanicheruvu	7.5	1.7	Dhaniyani cheruvu	164.70[1]
7.	Anantapur	N.P. Kunta	Pedaballe	6.4	15.6	Nagalcheruvu-Nayancheruvu (series tanks)	59.04 + 19
8.	Anantapur	Tanakallu	Bonthulapalle	21.8	1.3	Kothacheruvu	63
9.	Cuddapah	Chakarayapeta	Erragudi	3.8	36.6	Erragudi Pedda cheruvu	65.79
10.	Cuddapah	Galiveedu	Araveedu	12.4	2.1	Araveedu Pedda cheruvu	105

Source: PCA, 2000; ID, GoAP and District Revenue Records

[1] Comparing revenue records with data maintained by the Irrigation Department revealed a vast discrepancy in the size of *ayacut*. Revenue figures are submitted here. The cause and presumed politics behind the discrepancy has been described later in the paper.

delves into some caste-resource interactions through case studies, Part IV looks at the instrumentality of lease practices and traditional mechanisms, and Part V elaborates the policy-level and institutional dimensions by relying on a historical perspective. This is followed by a brief conclusion.

2. The context

i) Socio-cultural background of the region

Rural communities in the region are divided into four broad categories: the Scheduled Tribes comprising *Lambadis* and *Sugalis*; the Scheduled Castes consisting mainly of *Madigas* and *Malas*; the Backward Castes consisting of *Dhobis*, *Togatas*, *Gorallu*, *Pattara Nayalus, Besthas* and *Hajams*; and the Other Caste (OC) category comprising of *Muslim minorities*, *Balijas*, *Naidus* and *Reddys*. Table number 1 presents the SC/ST population in the villages housing the 10 tanks that were surveyed. The village tanks are basically in the nature of earthen bunds, constructed manually to block the flow of rainwater along a drainage line. The name of the village tanks and the size of the *ayacut* are presented.

The aforesaid villages fall in a drought-prone pocket shared by the districts of Anantapur, Chittoor and Cuddapah. Each of the villages mentioned above comprises of a number of habitations, and members of a given user group could be scattered across the different habitations of a village, or could be concentrated in a handful of neighbouring habitations. Rainfall here varies between 600mm to 800mm[1]. Agriculture and animal husbandry are the

[1] Important to mention, drought is not new to the region. Kendriya Sahitya academy award winner Late V. Venkata Subbaiah, in his socio-cultural discourse—*Rayalseema Adhunika Sahitya*, elaborates that the phenomena of drought (*karavu*) [as also migration (*valasa*) and inequities (*arthik asamanayata*)] are not of recent origin. He shares that during the rule of Achuta Deva Raya (1529 – 1542), the region of *Rayalseema* (comprising of the districts of Cuddapah, Anantapur, Kurnool and Chitoor) is said to have witnessed a drought that nearly wiped away two thirds of the population. Community interaction undertaken during the course of study revealed years of drought that are named after years from the sixty year *Telegu* calendar in which they fell. *Datu karavu* is recalled from folk memory for a drought that is said to have taken place in the 60th year of the *Telegu* calendar (*datuname samvasram*, 1876). In this respect one may also read, "Manmade 'Drought' in Rayalaseema", by Wendy K Olsen, appearing in *Economic and Political Weekly*, Vol. 22, No. 11 (Mar. 14, 1987), pp. 441-443.

main sources of livelihood. Cultivation of traditional varieties of millets such as *jowar*, *bajra*, *ragi*, *korralu*, *jonna* and *samalu,* and indigenous varieties of rice such as *byrudlu* and *tokkarudlu* have given way to rainfed cultivation of groundnut in recent times. However rice, particularly the market varieties such as IAT, *sona mashuri* and *tella hamsa* continue to dominate *ayacut* lands, which enjoy supplementary irrigation and make for some of the most coveted fertile patches in an otherwise arid terrain. Haulms of groundnut and crop residues from paddy and maize are used as fodder for stall-feeding cattle, while ruminants are mostly open-grazed along the revenue wastelands or forests. Here also village tanks are a vital source of fodder, either by way of crop residues, or the grass varieties that grow in their water spread area and *ayacut* during the fallow season. Non-land holding social groups, mostly the SCs and the STs, depend upon farm labour for sustenance. Alternatively, the 'lower-castes' seek wage labour in small-scale enterprises initiated by the economically well off. Many such enterprises (brick-making, silt extraction, fisheries *etc*.) directly depend upon the resources of village tanks. Village tanks, especially their water restraining bunds, are a rich source of fuel wood and NTFP such as medicinal plants, honey, thatching grass, fruits, and straw fibre. People are found to eke a living by making leaf-plates, weaving mats, collection and sale of tamarind, *Pongamia* and *Neem* seeds for extraction of oil, *etc*. wherever such resources are available in and around the village tank, or in the other commons such as the village wastelands and forests. Cultural expressions, particularly those associated with village tanks continue to survive. The two main festivals of *Dunnapothu* and *Mekapothu*, named so since they involve the sacrifice of a male buffalo and male goat respectively, are still celebrated. Other celebrations involving rituals, and processions (*jatras*) drawn in order to appease the gods / goddesses housed atop the tank bund (*katta maeda devaralu*) continue to remain popular (Shankari 1991).

ii) Institutional arrangements

Though the records of the state's Irrigation Department identify village tanks according to the Revenue Villages they fall under, the *panchayats* or the traditional bodies of local self-governance, along with their general bodies or *gram sabhas* exert an equally significant influence on the management of village tanks. The

panchayats have become elected bodies, unlike in an earlier day and age where the office of the head or the *sarpanch* was hereditary. It may be clarified that the borders of *panchayats* and Revenue Villages rarely correspond with one another, and the latter delineation is a more recent one that was effected on account of varied reasons ranging from administrative to political. In more recent times, the widespread intention of initiating irrigation "reforms" has taken the form of the Andhra Pradesh Farmers Management of Irrigation Systems (APFIMS) Act of 1997.

The Act provides for the formation of Neeti Viriyogadarulu Sanghas (Water Users Associations) for any tank enjoying an *ayacut* of more than 99 acres (40 hectares), with the prime purpose of tackling conflicts that presumably occur between the head and tail end landowners within the *ayacut*. The Water User Associations (WUAs) are elected bodies, and are primarily established by the Irrigation Department in 'participation' with local communities. Lower level functionaries that continue to exist as part of traditional systems include the *neerukattedars* and *thotties.* The WUA model seeks to recognise the roles played by such functionaries, even though it does not recognise their caste-related aspects.

The most common responsibilities of the *neerukattedars*— where the root word *neeru* means water, and *kattedar* the one who distributes— were to inspect bunds and channels during the monsoon season, to inform damages to structures, and to monitor illegal water tapping. They also participate in cultural festivities related to village tanks. In select instances, they mobilise landholders for the purpose of undertaking repair work on voluntary basis (*shramadhan*). In several areas current day versions of certain traditional practices still remain in force, and farmers are found to follow 'system of turn', popularly known as *warabandi* or *vattam*. This cycle of turns follows an approved schedule indicating the day, duration and time of supply. Schedules determining the quantity of release to individual landholdings are based on ocular estimates of available water in a tank, water requirement of crops (at the current stage of growth), and the size of individual landholdings. Since rice alone is cultivated in the *ayacut*, this calculation becomes somewhat simpler. *Thotties* on their part provide assistance to

the *neerukattedars,* and most often both belong to the landless ''lower castes'' having no direct stake in the water, at least, where agriculture is concerned.

3. The plurality of caste-water regimes

Given the above context, there is a tendency to simplistically distinguish soil and moisture regimes in the *ayacut* or command of a village tank as those that prevail between the head and tail end. Notwithstanding, differentials in productivity are far more intricate, just as the interactions between different caste-based clusters. More than two distinct regimes may prevail under a village tank. In several tanks it is found that apart from *beed bhoomi* or the marginalised lands in the tail, and *mitta prantam* or the highly fertile lands in the head end, there is the *kanah*. The *kanah* refers to lands that exclusively benefit from water seepage. Depending upon the hydrogeology of a village tank, the *kanha* could be located in the head end, or even in the tail end. The *kanah* does not require any irrigation support and is generally cultivated under indigenous rice varieties.

While the highly productive *mitta* lands are held by the 'upper castes' such as the *Naidus* and *Reddys*, the marginalised and relatively minuscule proportion of *beed bhoomi* is almost always under ''lower caste'' ownership, mostly SCs. Interestingly, the middle classes or the Backward Caste *Gorallus* most often hold lands in the *Kanah* that are of mediocre productivity. Perhaps, this should not be taken as a mere coincidence, but an instance of the relational nature between caste hierarchy, caste-based ownership and land productivity. The *Gorallus* are traditional herdsmen who in recent times have begun to maintain cattle as well. They undertake the propagation of an indigenous rice variety called *tokkaruddlu*, which is not only well suited to provide for fodder for their animals, on account of its being thickset and drought resistant, but also well adapted to the moisture regime of their *kanah* landholdings, where problems of water logging can make it risky to cultivate hybrid market varieties. But more importantly, we find that categories of land holding within the *ayacut* are layered, with each strata of productivity being under the control and ownership of a matching rung in the prevailing socio-economic hierarchy.

Conflicts, when they occur in such a scenario, and they commonly do so in response to both availability and scarcity of irrigation waters, are characteristically between each of the regimes and the castes that hold sway over them. Conflicts during the initial stages of water shortage, in a drought year, emerge as forced encroachments. Such encroachments are frequently attempted by the dominant castes. Usually the 'upper castes' holding the more fertile tracts or *mitta* try to encroach lands that enjoy a steady supply of seepage waters, particularly the *kanah* that is usually held by the backward castes, as already mentioned. This, however, is not always an easy task, especially where the backward castes are found to be dominant and politically active on account of their large numbers. In this regard, a local backward caste farmer at the village tank of Bandrevu was keen to share as to how several generations ago some of his kith and kin were sacrificed atop the tank bund to placate the rain and village gods; but their strength of numbers, and association with the BJP in recent times has made life difficult for the 'upper castes'[2].

This provides a partial explanation for those instances where the 'upper castes', and sometimes even the backward castes, in search of arable land, are found to have encroached lands designated as supply channels. For the SCs this is the best way in which both the backward castes and 'upper castes', equally poised in the political arena, strike a 'peace' without compromising on any gain. But, the consequent narrowing of such channels invariably thwarts supply to the tail-end lands or *beed* that continues to remain under 'lower caste' ownership for the most part. This is particularly true of tanks in Cuddapah district of AP.

On the other hand, in a good rainy year there is a greater likelihood that the 'upper castes' (and sometimes even the Backward Castes whose lands may get inundated due to excess seepage) will try and encroach lands in the drier tail end or on the fringes of the *ayacut* to capitalise on the increased availability of water. The *kanah,* which is fervently sought in a drought year by the 'upper castes', loses its importance in a good rainy year

[2] His greatest pride, after all, was that they now play a leading role in the ceremonies pertaining to the village tank. Fortunately, human sacrifices have long since been replaced with animal sacrifices here.

for the fear of water logging. Clearly, it is not drought or water shortages alone that can be blamed for conflicts.

Such dynamics and contestations are not confined to the caste groups that hold sway over the aforesaid three regimes. Where farmers have undertaken tube wells in the *ayacut*, yet another regime emerges. The propensity of a given caste to tap groundwater, or alternatively get trapped in debt by making heavy investments in groundwater, fuels a great many conflicts. The triad of the three surface level regimes enumerated so far, that is the *kanah*, *mitta* and *beed*, intermingle at Vittalarayani cheruvu with yet two other regimes based on the access to groundwater.

However, farmers enjoying access to groundwater through tube wells over here are far less willing to voluntarily contribute towards the timely maintenance of the village tank, colloquially known as *shramadan*. Those backward caste farmers, and more so the tenants (cultivating land on lease basis who lack access to groundwater), express regret, and often complaint that the tube-well owners, despite their plentiful and secured access to groundwater, are not willing to forego their share of supplementary irrigation from the tank in the event of water shortages and drought. An elderly backward caste woman who is a *neerukattedar* or local tank functionary here, was only too keen to vent her fury at the tube-well owners. In recent times they had not only failed to contribute voluntary labour for the upkeep of the tank infrastructure (i.e. *shramadan*), but even refused to pay her for her services, feeling they were unnecessary now. The luxury of groundwater has terribly corroded traditional mechanisms here.

The tank bed, also called the water-spread or water storage area, is yet another live site for contestations. It possesses a relatively superior moisture regime during the peak months of summer, on account of the residual water that remains trapped in small patches. The *ayacut* by this time is forced to remain fallow for the lack of surplus water. In such a scenario, where the tank bed continues to offer opportunities, on account of a comparatively better moisture regime, a competition ensues between different caste groups to grab and appropriate it for the *rabi* cultivation of vegetables or alternatively for converting it to a fodder plot. This either-or situation has its own dynamics, in

which caste has a role to play. At Dhaniyani cheruvu, the 'upper caste' *Reddy* landholders in the *ayacut* frequently determine the use the tank bed would be put to. At Chennarayanswami cheruvu, this decision is taken either by the 'lower caste' SCs or the backward caste group (*Togatas*), whichever of the two succeeds in acquiring leasehold over a majority of the 'upper caste' lands under the village tank. Here lease arrangements over *ayacut* lands originally owned by the 'upper castes', is deterministic of the manner in which the tank bed, a moisture regime among the many, is appropriated.

From the details provided so far, one finds multitudinous user regimes in and around village tanks, with each a site for contestation. The tank emerges as a labyrinthine reality. Many of these regimes, be they the *ayacut* or water-spread, the *kanah*, *mitta* or *beed* within the *ayacut*, pockets enjoying or not enjoying access to groundwater, they all intersect and overlap to create a profusion of possibilities within the subjective reality of a village tank. And this is only where agriculture is concerned. In the following section we seek to explore the dynamics between agriculture and the 'other' uses, as much as the intermediating agency of caste and formal state-devised institutions.

4. The nature of caste-resource interactions

One finds that irrigation organisation and resource use is inherently political, and the relationships between caste and politics cannot be overlooked. In the quagmire of interactions that are rarely acknowledged in full, especially in the WUA model, caste assumes the nature of centralised forms (Quigley 2003) that congregate and contest over the resources supported by the water of a village tank. A more detailed elaboration of the politics over water in rural agrarian societies, and the centralising nature of select castes, is made possible by the following narratives of two village tanks—Applama cheruvu and Kotala cheruvu.

i) Applama cheruvu - Resource availability and intra-caste conflicts

Applama cheruvu is located in Chittoor district. The *panchayat* of Picchalavandlapalle, which houses the village tank, comprises of

481 households of which 192 are SC households (Census, 2000)[3]. Despite these numbers, the *ayacut* is predominantly controlled by the 'upper caste' *Reddys*. Revenue records reveal that less than 1 percent of the total *ayacut* of 147 acres is held by the 'lower castes' (SC/ST). No more than 3.5 percent of the land is under the possession of backward caste (BC) farmers.

The tank has two sluices, of which only one is functional. During initial interactions some affluent members of the local Water Users Association (WUA), an institution established by the state Irrigation Department, shared that the sluice to the left hand side (left hand side [LHS] to the gradient of water flow) had been blocked as damages were noticed to the tank bund every time it was operated. They added that the single sluice on the right hand side (RHS) was sufficient to irrigate the entire *ayacut*. However, in due course, it was realised that almost all the lands under the blocked sluice belonged to the *Pokanatis*, a relatively less affluent sub-caste of the *Reddy* community. The *Pedagantis* (a relatively more affluent sub-caste of the Reddy community), in comparison, held large-sized landholdings under the single operational sluice, as well as positions in the WUA (even so at the *panchayat* level, thus making for a nepotistic alliance).

The 'lower caste' SCs, whose lands in the tail stand were encroached at the hands of the *Pedagantis*, shared that the latter had succeeded in acquiring most of the aforesaid positions in the WUA through brute force and violence (*godavalu*) in the previous WUA elections. Some of the 'lower caste' farmers felt that a strong sense of jāti-pride amongst both the *Pedagantis* and *Pokanatis* was partly responsible for the same[4]. The SC farmers also hinted, somewhat hesitantly, that had the *pokanatis* won the elections it would not have been the Left Hand Sluice (LHS), but

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[3] Here figures for the *Panchayat* are provided, and are not to be confused with the Village-wise SC / ST demography presented earlier as part of Table 1. The *Panchayat* figures are intentionally presented here, as it was found during the course of the study that the user-groups of this village tank were more so confined to the *Panchayat* and not the Revenue Village.

[4] This element of jāti-pride and political competitiveness manifests in cultural symbols and rituals at times. At Appalamacheruvu each *Reddy* farmer holding lands in the *ayacut* is insistent to undertake religious ceremonies atop the tank bund in an individual capacity, in a manner grander than his neighbours', even when such functions are a collective affair in almost every other village. This compares well with what was said earlier of Bandrevu cheruvu.

the Right Hand Sluice (RHS) that would have been blocked, so as to contain the flow of irrigation waters within their own fields.

More interestingly, the bund of the village tank incidentally rests upon a dyke. Owing to the fact that the outer folds of such igneous formations (i.e. dykes) are blessed with better water retention, the tank bund is thick with forest trees. The presiding WUA, also the presiding sub-caste, extends its unquestioned right over water and the sluices, and on the NTFP produce. NTFP is leased out for hefty amounts to commercial enterprises from nearby cities. A similar procedure is followed by the WUA where leasing out of the 'surplus' tank waters for commercial fisheries to outside agencies is concerned. Such developments take place regardless of the fact that the customary stake of 'lower castes' in NTFP and fisheries predates this present day 'prospecting' of rural resources by outside agencies in collusion with local state devised institutions (i.e. WUAs). In fact institutions such as the WUA at Appalama cheruvu facilitate the commercialisation of customary stakes. The 'lower castes' do not benefit from the lease proceeds either; rarely do they even know how the amount has been utilised.

Factional contestations over water, fisheries, and NTFP at Appalama cheruvu, through the medium of the WUA, are additionally related to the quest for groundwater. SC farmers share that whenever a Reddy farmer fails to tap groundwater, his most common reaction is to embrace faction politics and contest even more fiercely for control over alternate resources such as fisheries and NTFP. As per a SC farmer, 'this seems the best recourse for them to salvage their loss, and maybe even their jāti-pride'. Another *Bestha* fisherman beseechingly shared that:

Every time a Reddy farmer undertakes a tube well, we actually join him in prayers, we pray that he strike water, for a failed tube well means he would turn around and strike at (the root of) our livelihoods, he will snatch away our fish and our shrubs, he will snatch away that which is deservedly (traditionally) ours. [Parentheses by the author]

The irony, however, is that, the afore-mentioned dyke, a hydro-geological reality in the nature of a sub-surface wall, greatly restricts the lateral infiltration of water from the water

spread to the aquifers supporting the tube wells in the *ayacut.* This makes explorations in groundwater a risky business: the riskier the exploration in groundwater, the more intense the contestation over NTFP and fisheries. A dozen failed tube wells in the *ayacut,* the high order of conflicts over WUA positions, and the eagerness of the prevailing WUA to grab and lease out alternate resources such as NTFP, bear testimony to the same.

The village tank of Appalama cheruvu, thus, constitutes a typical case where apart from blatant opportunism and expediency, both the factors of resource availability (evident as part of an underlying fissure restricting groundwater recharge but enhancing availability of NTFP) and caste (as manifest in the presence of subgroups and socio-economic differentiation amongst the *Reddys*) is closely related to the formation of factions. Political rivalries and contestations between emerging factions, in turn, determines as to how the more productive resources of fish produce and NTFP are appropriated and leased out.

ii) Kotala cheruvu - State apparatus and the linking of resources

Kotala cheruvu's ayacut is recognised at 207 acres as per revenue records, and here also it is noticed that even though the *panchayat* of Kotala has a SC/ST population that nears 14%, only six acres in the *ayacut* appears as ST holding. Agriculture in the *ayacut* is less prone to the vagaries of monsoon since the village tank receives a generous supply of water from a medium irrigation project at about a distance of three to four kms at Pedderu.

Oral history has it that the tank was built by a warrior clan (*Palegars*) called *Yellamma Dorallus*. The remains of the *Dorallus'* fort still remain besides the village tank. Also visible is a patent moat that once supplied water from an earthen bund built by the *Dorallus* at a location called Pedderu, three to four kilometres away. The tank's own resources being seasonal, water from the earthen bund, which enjoyed an extended period of retention on account of hydro-geological advantages, was used to meet water shortages for domestic and household needs during the initial months of summer.

Now in the very same location of the earthen bund at Pedderu, there stands a medium irrigation project, popularly called the PR project. The PR project, in the nature of a dam, was built in 1976 under the aegis of a strong political leader whose forefathers had managed to usurp the territory of the *Yellamma Dorallus* as the reign of the latter weakened under a supposed curse (though a very interesting cultural facet of the tank, we need not go into the details of this curse here for the purpose of brevity). What counts as important is that this Brahmin political leader, entrenched in the state political apparatus, continues to hold almost all the irrigable lands falling under the *ayacut* of the village tank. He is called "appa", meaning father, by the localites. Appa's wife holds the post of *panchayat sarpanch.*

Officials of the Irrigation Department share that the PR project was originally planned at a different location and then shifted to Pedderu with some political "influence" being exercised by Appa. And even today Appa's irrigation needs influence the release of storage waters from the medium irrigation project to the village tank through the same channel that once fed the moat about the fort of the *Yellamma Dorallus*.

On a given occasion when the Irrigation Department had declined to release waters to the village tank from the dam, Appa mobilised the local communities for a protest or *dharna*. Even though the local communities did not benefit significantly from the village tank in terms of surface water for irrigation, they participated in the agitation for the reason that their meagre livestock would benefit from the surplus water apportioned to the village tank. Besides, the *dharna* was perceived as a chance for the 'lower castes' and the landless lot, which included a significant number of Sugalis (STs) from the neighbouring habitations, to express their allegiance to appa. By mobilising local communities and exercising 'influence', appa had water released to his village tank yet again.

The irony here is that all the four tube wells and a majority of the 10 open wells in the *ayacut* are under the ownership of the backward and 'lower castes'—the poorest of the poor. Appa's disinterest in groundwater is surprising at first; but then one realises this is primarily because of his capacity to influence the release of water from a distant dam to the village tank, and in

turn, to his sprawling farmlands in the head end. Appa arguably determines the time and duration of such releases (both from the dam and from the tank to his fields), apart from ensuring that water remains reserved for the interests of the outside agency to whom he has leased out the tank for commercial fisheries. This naturally forces the small and marginal farmers of the 'lower castes', who have little say in the management of surface water, to risk investments in tube wells—a source that they can at least claim as their own. Hence investments in groundwater are a forced decision, and indebtedness as a result of failed tube wells, a consequence of the same.

Omvedt (1994) has shared as to how the state represents the major axis of power in peasant societies, and how Brahmins and 'upper castes' by entrenching themselves in the state system have succeeded in exercising power over the peasant castes and *dalits*. Where Omvedt is able to link the overarching agency of the state with the political clout of a given caste, the linking of a smaller water body with a dam at the larger landscape level, speaks of similar truths. The linking of resources at two different scales (watershed and catchment) at *Kotala cheruvu* goes hand in hand with the integration of local caste hierarchies into state apparatuses, the micro with the macro.

From both the narratives, that of Apalamma cheruvu and Kotala cheruvu, one finds that the gamut of human-resource interactions is accompanied with the interplay of power and productive activity. The story of water usage in a rural context, with all its nuances and complexities, can rarely be understood unless one begins by acknowledging the role of caste and sub-castes as important facets of power, and the importance of water as an essential element for any productive activity.

5. The instrumentality of lease and 'traditional' mechanisms

Data has been hard to get by as part of the study, but it is found that in the case of at least four tanks the SC/ST land holding is nil. Incidentally, the revenue villages housing the aforesaid village tanks report a high SC/ST population. For instance, Bonthulapalle (Kotha cheruvu) has a high SC population of 21.8% (Census 2000). In Erraguddi (Erraguddi pedda cheruvu),

the ST population stands at a 36.6% (*ibid*). The extent of BC land holding varies with greater intensity across the village tanks. It is a high 74% in the case of Vittalarayani cheruvu, a moderate 28% in the case of Kotala cheruvu, and a negligible 2% in the case of Appalama cheruvu. Average BC landholding stands at 26%. But as far as the SC/ST farmers are concerned, the average landholding is below 3% of the total *ayacut* lands. Needless to say, such lands almost always fall in the marginalised tail ends (*beed bhoomi*), and not even in a single case is an SC/ST found to own lands in the head end of the *ayacut* of a village tank.

Table 2: Caste-based ownership of lands under village tanks[5]

Sl.	Tank name	Tank *ayacut*	Extent	Caste based ownership of *ayacut* land (acres)			
				SC	ST	BC	OC
1	Appalama cheruvu	Total *ayacut*	**142**	**.40**	**0.40**	**3.76**	**137.44**
2	Chennarayanswami cheruvu	Total *ayacut*	**106**	**0**	**0**	**22**	**84**
3	Kotala cheruvu	Total *ayacut*	**207**	**0**	**6**	**60**	**141**
4	Bandrevu cheruvu	Total *ayacut*	**104.4**	**1.83**	**3.16**	**27**	**72.41**
5	Vittalarayani cheruvu	Total *ayacut*	**79.1**	**0.09**	**0.93**	**59.29**	**18.79**
6	Dhaniyani cheruvu	Total *ayacut*	**164.70**	**7**	**7**	**50**	**100.70**
7	Nagalcheruvu-Nayancheruvu	Total *ayacut*	**73.04**	**3.04**	**3**	**17**	**50**
8	Kothacheruvu	Total *ayacut*	**73.22**	**0**	**0**	**15. 45**	**57. 77**
9	Yerragudi Pedda cheruvu	Total *ayacut*	**65.79**	**0**	**0**	**15.79**	**50**
10	Araveedu Peddacheruvu	Total *ayacut*	**105**	**0**	**0**	**25**	**80**
	Total landholding		**1,120.25**	**12.36**	**20.49**	**295.29**	**792.11**

[5] It is important to clarify a few details as regards the figures that are presented as part of the table: (a) due to a vast discrepancy between the data maintained by the Irrigation Dept. and the Revenue Department at Dhaniyani cheruvu and Kotala cheruvu, the more realistic figures reported by the latter were relied upon, (b) Similarly, a caste-wise break up of land holding was not available in the case of Nagalcheruvu - Nayancheruvu, Yeragudi Pedda Cheruvu and Araveedu Pedda Cheruvu. Caste wise summaries were arrived at through community interaction, in absence of departmental data (in all other cases total land holding and caste-wise land holding is based on authentic departmental data), and (c) the above details are strictly with regard to landholding, and do not include land held by the 'lower castes' as part of lease arrangements.

In some of the village tanks in Cuddapah district, it was discovered that SC farmers seeking lease were less keen to undertake timely maintenance of the village tank. So long as one succeeded in obtaining lease over lands in the head end, the damage to bunds, sluices, and supply channels could be conveniently overlooked. "Ma Jameen, maa di", one lessee was found saying, meaning, "our plot unto ourselves, the rest does not matter". Poor tank maintenance over a period of time has resulted in a shrinking of irrigable lands under the village tank, resulting in increased competition for lease for land in the head-end. The strife for lease in the case of the village tank of Yerraguddi cheruvu, Cuddapah district, has resulted in violence and distrust amongst many 'lower castes' and landless farmers. A 'lower caste' farmer here was found to lament that the practice of lease had torn apart ('chini parindi') relations between members of his caste.

On the other hand there are instances where lease arrangements have truly gone to collectivise lessee farmers of 'lower caste' groups. At the village tank of Chennarayanswami cheruvu, no sooner did the backward and 'lower caste' groups of Gundlapalle *panchayat* begin to acquire lease and extend greater control over *ayacut* lands that they sought to prevent the lease of other tank related resources such as fish produce and NTFP at the hands of the WUA to commercial enterprises[6]. Evidently these were resources in which the lessee groups, particularly the backward caste *Besthas*, had exercised a customary stake. Such progressive developments had involved a significant amount of strife, especially in the village level meetings and *gram sabhas*.

Struggles were pronounced because lessee farmers in the past had never benefited from such lease-outs to commercial agents from cities. One *Bestha* farmer enjoying leasehold had even remarked that the popularity of leasehold had helped in conserving groundwater—for it would hardly be practical for a farmer to undertake a tube well on a plot of land he didn't own. The detrimental effects of uncontrolled groundwater exploitation to socio-institutional processes have been explained

[6] Such lease arrangements in favour of the 'lower castes' had partly become possible because of a great many 'upper caste'youth, either migrating to towns and cities, or opting for white collar jobs.

before. The *Bestha* added that this kept all the farmers interested in surface water, and equally willing to provide for timely repairs to ensure dependable flows. In his opinion, it was this fact, and not the efforts of the WUA, that made the tank a well-maintained exception in the region. Thus, it is difficult to say where land lease will favour equity, and where it will not, without looking at the contextual reality of a given tank.

But where lease arrangements over fisheries in favour of outside agencies are successfully reversed through collective action, traditional arrangements frequently come into play. As part of such arrangements, popularly called *kolu*, village elders fix a period for harvest. It is interesting to note how the local elites and fisher folk refer to the practice of *Kolu* in two very different ways. Even as the backward castes associate great value with arrangements that favour customary access, the elite paraphrase the invocation of traditional arrangements as '*cheruvu kolu poindi*', in a tone implying that the tank has been lost to traditional arrangements; truly so for an affluent minority that is no longer able to prosper by leasing out the resource.

Under the traditional arrangements of *kolu*, no villager is allowed to harvest fish before this period. The fishing period is announced with the aid of a drum called *dhindora* and commercial sale of the harvest is discouraged, unless in small quantities at the hands of poor landless households. In the absence of such commercial lease arrangements, tank waters are availed for a host of other purposes such as clothes and utensils washing, bathing of livestock *etc*. by the 'lower caste' women. The pollution of water through detergents and soap becomes less of a concern even where fish produce is at stake. The local indigenous varieties of fish are believed to be hardy and resilient to soaps and detergents, when compared to commercial varieties undertaken by outside agencies.

Unfortunately such practices (i.e. *kolu*) rarely remain in place for a few years, before the tank resources are leased out again to outside agencies. Prohibitions over washing and bathing are re-imposed, with ill consequences for women. The account of an aged landless labourer claimed that the fact of such reversals had something to do with the political mileage or *maryadae* of a village level representative. His account reads as follows: the

practice of lease draws a large amount of flak from community members. By denying the poor (SCs / STs/ OBCs) rights over fish produce or NTFP, and misappropriating the lease proceeds, the concerned WUA president (or even the *sarpanch*) seeks to lose a sizable portion of his constituency (to the opposition). A number of WUA presidents are found to win elections on the basis of promises that such lease arrangements (to outside enterprises) will never be encouraged in the future. But when the village or institution representative's tenure is drawing to a close, or he is doubtful of winning in the coming elections, or he is disinterested in contesting or continuing in his office, then underhand earnings from the lease of village tanks are preferred over political mileage (*maryadae*).

Decision-making over resources supported by tank waters are not determined by an annual cycle, by seasons of a calendar alone. Larger and long-spread electoral cycles conjoin with the seasonal availability of water in determining resource appropriation. One may conclude that both conflicts and collective action as regards resources such as fisheries and NTFP concur within a political-ecological matrix, wherein seasonality, drought and shortages figure along one axis and political action and caste dynamics at the village level along the other.

The lease agreements in question, most often involving resources such as NTFP and fish produce, are confined to commercial enterprises, often based in a nearby town or city, and the village level leader (*pratinidhi, pedda manshi*). In this sense both the WUA president and / or *panchayat sarpanch* (the ordained *pedda manshis*) preside and pocket the lease proceeds. Even if such arrangements are considered 'legal' on account of involving signatures and stamp papers, they can hardly be considered 'binding' as they are effected in a manner most non-transparent, without the consent of a lot many of the 'lower castes' holding a traditional stake in the said resources. Jurisprudence or the district bureaucracy does not acknowledge the traditional or customary stakes, and such lease arrangements, binding or not binding, are affected with relative ease. A disabling jurisprudence is accompanied with a great many other tactics at the field level, tactics that diffuse collective action, and pave the way for leasing

out resources such as fish produce and NTFP[7]. The timing of lease within an electoral cycle is perceived as tactical.

The village tank of Dhaniyani cheruvu makes for another interesting case. At this village tank one finds that the voting list maintained by the Irrigation Department contains no more than a total of 36 *ayacutdars* holding 42 acres of the total land in the *ayacut.* The revenue records, on the other hand, point to a more realistic extent of 162 acres. This blatant discrepancy has never been resolved despite the fact that the APFIMS Act of 1997 provides for the resolution of such errors. The names omitted in the list of the irrigation department are mainly that of the lower and backward caste landholders. Such farmers or *ayacutdars* press for their interests, but without the power of a vote in the WUA elections. The WUA, thus, concentrates power and decision-making with a select few amongst the 'upper castes' and joins with the mandal or taluka level bureaucracy in leasing out tank related resources. It is found that the mandal level officials have a grave role to play in the enforcement of prohibitions that accompany such lease arrangements.

In addition, it is suspected that the APFIMS Act of 1997, and the prevailing NGOs, tend to romanticise traditional arrangements, even if notionally. The truth is that traditional office holding does not go uninfluenced in the scheme of things. In a multiple-use scenario, where different castes command differential stakes, an "appa" may prefer to field or support a *neerukattedar*, a traditional 'lower caste' irrigation worker, for the post of *sarpanch* or WUA president. This tactically helps to satisfy the reservation criteria since *neerukattedars* are from among the 'lower castes'. In addition, being traditionally dependent upon

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[7] In this regard see Videh Upadhyay (2003); *Customary Rights over Tanks: Some Plain Talking on Limits of Customs*, Economic and Political Weekly (EPW), November 1, pp. 4643 – 47: the author shares that as per a Supreme Court ruling the *Dhimar* community lost their right to fish produce when a decision was made in favor of the tank owners. Customary rights remained inadmissible by the Supreme Court. It was maintained that the *Dhimars* had no right independently of the 'theka' agreement with the proprietors. The author contends that 'customs are only a source of law and they become such a source only when they are recorded in statutes or recognised by court'; unfortunately so for the *Dhimars* they were not able to establish their customary rights or have them recorded on account of their illiteracy and low status.

the 'upper caste' landholders for wage labour, a *neerukattedar's* sense of allegiance most often prods him to serve the interests of the local elites from the new office he has been so graciously raised to. More often than not, ascension to higher posts strengthens the unsuspecting *neerukattedar's* sense of allegiance. For instance, villagers depending upon the series tank of Nagalcheruvu-Nayancheruvu felt that the landlord had greatly succeeded in consolidating his encroachments in the water spread by campaigning / lobbying for the *neerukattedar* and bringing him to the post of *sarpanch*. The *neerukattedar* previously serving the irrigation interests of the local landlord in the capacity of a simple tank functionary is now obliged to safeguard his benefactor's encroachments in an elevated capacity as a *sarpanch*.

6. Policies and institutions

Caste-based ownership of the lands under a village tank are inequitable, and this aspect extends itself very naturally to every other resource supported by the self-same water that supports agriculture in the *ayacut*. In the final part of the present paper it is argued that the problem was never as acute in the years preceding colonial rule, and the issue at hand, demands a historical re-assessment in the least. Folk history indicates that the phenomenon of resource partitioning was in full evidence in days past. In speaking of resource partitioning within the said context, a third generation landless SC labourer was found to recall: in the past the *Besthas* or the fisher folk were known to customarily rely upon fish produce of the tank, the local matt weavers or *Togatas* upon straw varieties growing on the bund, the potters or *Kummaralu* on the silt, and the herdsmen or *Gorallu* upon fodder varieties growing in the water-spread area. The *zamindars* on their part would undertake agriculture with the assistance of the above groups or the landless SC/STs, and strategically provision access to "left over" resources such as NTFP, fish produce *etc*., in exchange for the services received from such groups.

This symbiotic arrangement greatly reduced competition over the resources of a village tank. It is important to mention that such aspects of folk history were not recalled with the intention of glorifying the *zamindari*. However, this symbiotic arrangement, with its own set of imperfections, regressed drastically with

the commencement of colonial rule. The combined effect of the ryotwari system and the Madras Compulsory Labour Act of 1858, also known as the *Kudimaramath* Act, had a significant impact in this regard. Though a *ryot* came to be deemed a proprietor of his land under this system, and could not be evicted as long as he paid his dues, resources such as community woodlots, forests and village tanks that had no individual claimants to their tally came to be categorised as common properties. They were consequently brought under the purview of bureaucratic departments. Village water bodies, like forests, came to be developed by the Raj with the sole purpose of revenue maximisation through the single pointed pursuit of agriculture in the *ayacut*. It is, therefore, not surprising that village water bodies for long remained under the control of the "Revenue" Department[8]. Revenue maximisation though agriculture, at this juncture, became the meeting point between the emergent bureaucracy and local elites, as agriculture was the mainstay of the 'upper castes' as well. This cemented the modern day imagination of village tanks as single-use irrigation units, bereft of 'other' uses.

The Kudimaramath Act on the other hand made the traditional practice of undertaking repairs (*maramath*) legally enforceable. Mosse (1998) says of the aforesaid Act, that, it not only rendered an otherwise traditional system of tank management more amenable to administrative manipulation, but it also legitimised the bureaucracy's demands on labour. Thus, two significant factors, (a) a parity of interests between the bureaucracy and the 'upper caste' *zamindars* where revenue maximisation through agriculture was concerned, and, (b) the fact that the *zamindars* were no longer required to barter "left over" resources with the 'lower castes' but could now simply rely on the coercive power of the bureaucracy to meet their labour requirements (be it for repair or agricultural pursuit), egged the first formation of a nexus, that has lasted till today.

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[8] As per the North India Canal and Drainage Act, 1873, "the provincial government is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes and other natural collections of still water." As per the Indian Easements Act, 1882, community based rights could be overridden by "any 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."

It is believed that this nexus has also enabled members of the same 'upper caste' communities to dominate in WUA positions (apart from a great many other schemes and programmes over the years) and usurp other valuable resources that were originally bartered with the 'lower castes' for their services[9]. This process of marginalisation has greatly de-collectivised tank management, and it is in the light of the preceding discussion we can understand claims that pre-existing irrigation systems survived better under the *zamindari* system when compared to those falling under ryotwari (Sengupta 1980; Sherrard 1916).

However, it is important to recognise that in the midst of policy-level developments, it is this strategic nexus between the 'upper caste' elites and the bureaucracy, which in part ties caste, water and power into its present configuration. It is believed that this nexus has precipitated certain colonial perceptions into the present day policy framework as well. For instance, the APFIMS Act of 1997 restricts the membership to WUAs and voting rights to agriculturist landholders in the water user area [Chapter II, Sec. 3 (4) (i) and (v)]. This promotes a parochial idea of water rights as only that of 'upper caste' agriculturists, and keeps marginalised user groups, such as women, matt weavers, traditional fishing communities, washer folk and even nomadic livestock herders from participating in decision-making. Very clearly, multiple-use and caste dynamics are close co-relates—to undermine the fact of multiple-use is to obfuscate the manner in which certain users/uses prevail, crowd or dominate over others. Similarly, Sec. 26 as part of Chapter VI of the Act provides a schema for conflict resolution, assuming that such conflicts are only likely to occur within members of WUA or between different WUAs. Increased conflicts over critical resources are witnessed not just between members of WUAs but with other marginalised groups, which mostly belong to the 'lower castes'. In fact, this turning a blind eye to the true nature of conflicts is the very first step in negating the stakes of the 'lower castes'. Then, there are other aspects, such as linkages between surface and groundwater, as we have hinted before, that are completely missed by the

[9] This aspect has to be read along with other developments in recent times such as the prospecting of tank based resources by outside agencies, commercialisation of fisheries and NTFP, current day practices of lease, and demand and supply of labour on account of migration patterns.

APFIMS Act of 1997. These aspects make a re-visioning of the Act necessary.

7. Conclusion

As part of the conclusion it is important to mention that where tank rehabilitation is concerned, facilitating agencies are simply not able to fathom the complexities at hand. Land holding within the *ayacut* is layered, with each grade of its productivity under the control and ownership of a matching rung of the prevailing socio-economic hierarchy. The regime-based reality of each tank is labyrinthine, to say the least, with caste playing a decisive role at every stage. Appalama cheruvu, where resource availability and intra-caste conflicts converge, and Kotala Cheruvu, where the linking of resources at two different scales complements the integration of caste with the state apparatus, are important cases for consideration. From both the case studies it emerges that caste has to be relocated in a resource framework, within suitable spatial and temporal scales. The manner in which collective action is diffused through faulty electoral lists, the instrumentality of lease arrangements, and the manipulable nature of traditional arrangements are some of the other dimensions that demand our attention.

It is often said that tank rehabilitation measures have failed time and again due to the lack of political will (Vaidyanathan 2001; Reddy and Reddy 2005)[10]. This argument, at times, yields to the famous presumption that a policy level change will generate the required political will. Policy is indeed an important arena for change, and a re-visioning of the APFIMS Act of 1997 is long since overdue. But it is collusions at the field level that determine the extent to which a given policy becomes binding. Thus, it is the politics, tactics and instrumentalities at the field level that demand active engagement through action-based research. The necessity for such research emerges from numerous facts, the most important of which is that the seasons of a calendar

[10] Also see *Project Implementation Plan, Andhra Pradesh Community Based Tank Management Project* (APCBTMP), Irrigation and CAD Department, GoAP (2006) as per the report "The second minor irrigation commission reports that at the time of census 29,187 tanks were not in use in the state. This amounts to nearly 36% of tanks in the state. The proportion of area irrigated under tanks has shown a significant decline from 39% in 1955 to 14% in 2005" (p.4).

year are not alone in determining the manner in which water is appropriated. Larger and long-spread electoral cycles, comprising of vehement political action and caste interactions are perhaps equally important.

It is hoped that the details provided so far would do away with the prevailing naiveté where interrelations between water, caste and power are concerned. The narratives and instances provided so far may not be able to make for another emphatic 'guideline' or set of 'recommendations'; maybe, they are not intended to do so. But it is hoped that they will shed light on some of the myriad possibilities and dynamics where water management is concerned, by locating caste dynamics and power in a resource framework. Such dynamics, true to a potter's words, reflect best in water.

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Interstate water allocations, dams and conflicts

K. J. Joy and Suhas Paranjape

1. Introduction: setting the contours of the paper

Interstate water allocations, especially through Tribunals set up for the purpose, have been a contentious issue, and have often been the source of conflicts amongst the contending riparian states. In this context, this paper does not deal with the details of how water gets allocated between different states or the conflicts arising out of the same, not does it attempt a comprehensive critique of the process of interstate water allocation or the functioning of the Tribunals or the Inter State Water Dispute Tribunals (ISWDT) Act of 1956. The focus of this paper is on considering a few cases of dams (and diversions) as the main instrument of actually providing the water share allocated to the contending states by the Tribunals and the different types of conflicts associated with dams. In other words, the paper explores these dams as links between inter-state water allocations and conflicts. Often the discourse on conflicts around dams is largely about submergence and displacement. Recently many other types of conflicts around dams have also come to the fore. Dam safety, reservoir operations and impact on downstream areas – in terms of floods, downstream uses and environmental flows – are all examples of this. This paper attempts to include these new set of issues as well.

Approaching the issue of interstate water allocations and conflicts thorough dams gives us a handle to think of alternative ways in which some of these conflicts can be resolved, mitigated, prevented or, at the least be made more tractable. Therefore, the paper also explores alternative frameworks, including specific suggestions, to address these conflicts. This is also not to argue against the importance of a much needed and ongoing critique of the Tribunals or the Inter State Water Dispute Tribunals (ISWDT) Act, and the ways in which these function. There is a growing literature on the topic that we shall also draw upon.

This paper is divided into five sections. This, the first section, provides an introduction and a roadmap to the paper.

This paper takes up three dams which have been sources of conflicts amongst the riparian (and in one case non-riparian) states. The three cases are: 1) The Sardar Sarovar Project (SSP) on the Narmada River; 2) Almatti dam on the Krishna River; and 3) Mullaperiyar dam on Mullaperiyar River. These three dams bring out some of the important dimensions of transboundary water allocations, contestations and conflicts. For example, in the case of SSP, the Narmada Water Disputes Tribunal fixed the height of the Sardar Sarovar dam which in a way foreclosed any alternatives having a component of height reduction and the resultant reduction in submergence and displacement. The case of Almatti dam brings out the issue of reservoir operations; this became a source of conflict between Maharashtra and Karnataka because of upstream flooding in 2005. The Mullaperiyar dam centre-stages the issue of dam safety and the insecurities faced by downstream people. The next three sections offer brief descriptions of the relevant aspects of these three cases. The concluding section reflects on the three cases, raises a number of issues regarding interstate disputes, and suggests some ways forward as part of a broader approach to engage with interstate water allocations and conflicts.

2. The Sardar Sarovar Project

The Sardar Sarovar dam on the Narmada is the main instrument to provide the share of Narmada waters allocated to Gujarat by the Narmada Water Disputes Tribunal (NWDP). From its inception, the Sardar Sarovar Project (SSP) has been the focus of an ongoing conflict for the last three to four decades. As a result of the conflict, the project had been deadlocked for many years. Though the construction has nearly reached its full height, the conflict and contestations still continue.

The Narmada Water Disputes Tribunal verdict

The Narmada Water Disputes Tribunal (NWDT) gave its verdict in 1979. According to this verdict, Gujarat was allocated 9 Million Acre Feet (MAF) of water[1]. This allocation of 9 MAF of

[1] See Clause III - Apportionment of the Utilisable Quantum of Narmada Waters of Narmada Waters of the Final order and decision of the Tribunal, Gazetted on December 12, 1979.

water to Gujarat has been contested on many counts.

1) As per the data that was used by the Tribunal, the 75% dependable flow was estimated to be 27 MAF[2]. However, the more recent data shows that it is only 23 MAF[3]. It shows how important it is to have reliable and commonly agreed upon data sets in the working of Tribunals and interstate allocations.

2) The entire 27 MAF flow had been allocated amongst the four states of Madhya Pradesh, Gujarat, Maharashtra and Rajasthan, though the share allocated to the latter two states is negligible. There is no provision for ecosystem flows or even minimum flows (at 75% dependability). Though there is a growing consciousness throughout the world about the need to keep certain flows unbound in the river for preserving ecosystem health, and also to meet the needs of the downstream users, this does not seem to have percolated into the arena of interstate water allocations[4].

3) Gujarat has been given 9 MAF of water which many think is disproportionate to its contribution to the Narmada flow if one goes by the logic of relative riparian contribution as the basis of allocations amongst the riparian states. Here drought (in large tracts of Kutch, Saurashtra and North Gujarat) was used as the rationale for a higher allocation of water to Gujarat. This brings to the fore the absence of agreed upon principles or norms for water sharing, a critical issue in the context of interstate water allocations and disputes.

4) Rajasthan, though not a riparian state, was also given a share, and here too drought was used as the reason. Here the larger question is, should water be diverted to non-riparian states? Also, do the Tribunals have a mandate to allocate water to non-riparian states?

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[2] See Clause II - Determination Of The Utilisable Quantum of Narmada Waters of the Final order and decision of the Tribunal, Gazetted on December 12, 1979

[3] See Paranjape and Joy (1995) for a detailed discussion on this.

[4] The 2010 Krishna Tribunal verdict provides for a total of 16 TMC water out of a total of 2293 TMC (at 65% dependability) for environmental flows and this comes to only about 0.70%.

Mandate of the tribunals

Another issue of concern is that the Narmada Tribunal also fixed the height of the Sardar Sarovar dam at 138.7 meters. Clause VII - Full Reservoir Level and Maximum Water Level of the Sardar Sarovar Dam of the Final order and decision of the Tribunal, Gazetted on December 12, 1979, says, "The Tribunal hereby determines that the height of the Sardar Sarovar Dam should be fixed for Full Reservoir Level + 138.68 m., (+455′) and Maximum Water Level at (+) 140.21 m., (+460′). Gujarat shall take up and complete the construction of the dam accordingly". Should a Tribunal fix the height of the dam? Or should it limit itself to the allocation of water?[5] Also there are larger questions like what should be binding in a Tribunal's verdict and what should not be binding? The Tribunal's verdict needs to be seen or reviewed in the changing socio-economic-political context as well as the changing techno-institutional context. In fact, if the Tribunal had not stipulated the height for SSP, then probably it might have been possible to explore options of utilising Gujarat's share of water even with a lower height of the dam. Such an option would have mitigated/resolved some of the conflicts around SSP, especially those arising out of submergence and displacement. Treating every word of the Tribunal as binding, and Gujarat holding on to such a position, barred the way to any negotiation, even when some of the alternatives that came up essentially argued for providing the same amount of water to Gujarat but with a lower height of the dam. Paranjape and Joy (1995)[6] came up with an alternative plan to restructure SSP. The alternative argues for a lower height of the dam without compromising the water share already allocated to Gujarat, brings down submergence and displacement considerably, and guarantees unbound post-monsoon flows for ecosystem health and needs of the downstream communities. (For its salient features and a comparison see Table 1 in the next page.)

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[5] Of course the issue is more complex than it looks like because along with allocation of water the Tribunal also allocated the electricity that would be generated at SSP amongst the riparian states. Because of this, from a conventional viewpoint, the issue of height of the dam becomes important. However there are different options for power generation like the run off of the river system where there is no requirement of large storages behind he dam. This issue s discussed in Paranajape and Joy, 1995.

[6] For details see Paranjape, Suhas and K. J. Joy (1995).

Table 1: Comparison of SSP with the restructuring proposed by Paranjape and Joy (1995)

No.	Item	Alternative Plan	Current Plan
1	Storage level at SS dam	107 m (90 m baseline level)	140 m
2	Total Submergence	10,800 ha	36,000 ha
3	Displacement	Drastic Reduction in displacement	1.5 lakh people displaced
4	Rehabilitation	Within the same area with assured share of Narmada water	Uprooted, rehabilitation in new area
5	Upstream Service Area	more than 1 lakh ha	Nil
6	Gujarat Service Area	41 lakh ha	18 lakh ha
	(of which)		
	Saurashtra	13.1 lakh ha (32%)	3.9 lakh ha (22%)
	Kutch	4.0 lakh ha (10%)	0.4 lakh ha (2%)
	North Gujarat	14.7 lakh ha (36%)	3.1 lakh ha (17%)
	Rest of Gujarat	8.9 lakh ha (22%)	10.6 lakh ha (59%)
7	New electricity generation	850 MW	1400 MW
		2600 MU	3600 MU
	Consumed in the project	1646 MU	1138 MU
	Peak load capacity	1200 MW	1400 MW
	Gas-solar hybrid generation out of saving	200 MW	Nil
		1750 MU	Nil
8	Surplus energy	at least 4410 MU (26.3 MT) produced as biomass	Not planned
9	Equitable water distribution and sustainable development	Basic issue	Not planned
10	Total cost	12,920 crores	13,000 crores
	of which		
	Expenses on local employment and services	3,620 crores	Negligible
11	Cost recovery	Based on distinction between basic and economic service	No such plan
12	Gujarat's total share of Narmada water	9 MAF	9 MAF
13	Loss of Forest	3,000 ha by submergence and 10,000 ha low grade forest for rehabilitation	13,700 ha substantial prime quality forest
14	Permanent vegetative cover in service area	11 lakh ha(23,000 ha in upstream contiguous to forest area)	No provision

At present, the SSP stands at a height of about 122 meters as the height of the dam was increased after the Supreme Court gave its go ahead a few years ago. This does not mean that all the issues around SSP have been settled. Over the last couple of years, the Forum for Policy Dialogue on Water Conflicts held informal discussions with many of the people who have been concerned about SSP (the proponents of the dam, the opponents, and those who want to find a middle path between the two extreme positions). What came out of the discussion was quite interesting. It showed that now there was a possibility of bringing these diverse sections around for a dialogue if the discussion centred around three substantive issues around SSP needing resolution.

Height of the dam: Building a consensus on the height of the dam at which the construction could be halted at least temporarily so that time would be allowed to re-look at the all consequences and discuss them so as to avoid further large-scale displacement as much as possible without compromising Gujarat's share of water. There are signs that Madhya Pradesh (MP) might be increasingly worried about the ability to deal with additional submergence, and now that SSP has successfully diverted water to large parts of Gujarat without reaching full height there are now signs that the proponents may also be ready to at least discuss the possibility of a lower height without compromising the ability of Gujarat to serve all its areas. Therefore, the present height of the dam and the need for its further increase should be viewed in the context of - a) the ability to supply water to any part of Gujarat; and, b) the submergence and displacement taking place between dam heights of 122 m and 138.7 m. The latter would be much more massive, would be situated in a much more politically sensitive region, and given MP's earlier record, the magnitude of rehabilitation might well be impossible for it to handle successfully. Moreover, the additional storage is created by 18 m high gates which mainly serve the purpose of power generation, and, actually corresponds to MP's share of power. There are also signs that MP may be ready to trade off this prospective power benefit against the reduced rehabilitation burden. In fact, it may be possible to halt construction at this point, take a pause, and take a hard look at the possibilities and if it is found necessary, the gates could be installed later. So there is a possibility to build a consensus on freezing the height of

the dam at the current level for at least some time until all the issues, especially the past and future rehabilitation issues, are adequately addressed.

Equitable distribution, sustainable use and participatory management of stored water: It is not often realised that many of the proponents of the SSP supported it because it promised equitable, efficient and participative water management within its command. None of this has really taken place. Practically none of the efficiency enhancement measures that were promised have been implemented. The distribution of the water, especially for irrigation, is heavily skewed in favour of water-rich central Gujarat as against the drought-prone regions of Kutch, Saurashtra and North Gujarat in whose name Gujarat had been allocated an unusually large water share by the NWDT. Participatory instruments such as water user associations (WUAs) are either non-existent or in a mess. Many of the critics had warned of this, but given the plans presented on paper, the proponents thought they were being overly sceptical. However, now even they are worried. So, the proper distribution and management of already stored water is now a concern for everybody, and not only for those who have been opponents of the project. This is, therefore, another issue around which a dialogue seems possible.

Status of displacement and rehabilitation: There is a large gap in the perception and articulation of the issue of displacement and rehabilitation by supporters and opponents of SSP, as well as in the data provided by different government and non-government agencies about both the quality of rehabilitation, and the exact numbers involved. This issue needs to be addressed squarely and independently. It is a pity that as a society we have not been able to agree on what is the exact status of displacement and rehabilitation. The relief and rehabilitation (R&R) effort around the SSP have perhaps been the largest and certainly the most discussed and debated displacement and rehabilitation issue in the recent past. It is important to reflect on the learning from the SSP experience of R&R of the last 20-25 years in the broader context of displacement. Starting with setting up a process by which at least baseline data on this issue can be shared and owned by the contending parties, it is important to set up a common process of analytical exchange in which analytical results and policy implications can be fruitfully discussed.

3. The Almatti dam

The Government of India constituted the Krishna Waters Disputes Tribunal (KWDT) in 1969 under the Inter State Water Disputes Act of 1956 to settle the disputes over sharing of Krishna waters amongst the three riparian states of Maharashtra, Karnataka and Andhra Pradesh. This was headed by R. S Bachawat, a former judge of the Supreme Court of India. Hence, the award of the KWDT is also called the Bachawat Award. The Bachawat Tribunal gave its final award in 1973. While the Tribunal had in its earlier report detailed two schemes, Scheme A and Scheme B, the final award only included Scheme A and Scheme B was left out. Scheme A pertained to the division of the available waters based on 75% dependability, while Scheme B recommended ways to share the surplus waters.

The KWDT in its award outlined the exact share of each state. The award contended that the total quantum of water available for distribution was 2060 TMC at 75% dependability. This was apportioned between the three states in the following manner: Maharashtra - 560 TMC, Karnataka – 700 TMC, and Andhra Pradesh – 800 TMC. The states were also allowed to use regeneration/return flows to the extent of 25, 34 and 11 TMC respectively.

The Tribunal in its report, under Scheme B, also allocated the "surplus" water, estimated to be 330 TMC, in the following proportions: Maharashtra – 25%, Karnataka – 50%, and Andhra Pradesh - 25%. The Tribunal, in its Scheme B, also suggested setting up Krishna River Valley Authority to ensure the implementation of the scheme. Since this was outside the purview of the Inter States Water Disputes Act 1956, Scheme B was left out of the award.

The KWDT also provided for a review of its award after 31 May, 2000 with a proviso that any "unutilised" share of water by the three states could be opened for re-negotiation. However, no such review was taken up for more than 3 years after the specified date. In September 2003, the second KWDT, KWDT-II, under the Chairmanship of Shri Justice S.P. Srivastava, was constituted by the Government of India following requests by all three states. This tribunal started its proceedings from July 2007 and gave its verdict in 2010.

The total demand put up by the three states came to about 4800 TMC with the following break up: Maharashtra- about 1168 TMC; Karnataka- about 1400 TMC and Andhra Pradesh- 2224.72 TMC. Analysing the water series data for the last 47 years the Tribunal estimated the average water availability to be at 2578 TMC and the availability at 65% to be at 2293 TMC. The earlier Krishna Water Disputes Tribunal (KWDT-I) had estimated the 75% dependable availability to be 2060 TMC, and the return flows to the extent of 70 TMC totaling 2130 TMC, and it had apportioned this amongst the three states. The present Tribunal decided to maintain this allocation. The Tribunal decided to allocate 163 TMC which is the difference between water available at 65% dependability (2293 TMC) and the water available at 75% dependability and the return flows (2130 TMC). The Tribunal called this the apportionment of the dependable flow. Apart from this, the Tribunal also estimated the "surplus" water, the difference between the average availability of water (2578 TMC) and the water available at 65% dependability (2293 TMC) to be 285 TMC. From this, 150 TMC for carryover storage in Nagarjunasagar and Srisailam dams in Andhra Pradesh[7] was deducted, and thus the available "surplus water" for apportionment was fixed at 135 TMC. Thus, the water available for fresh apportionment by the present Tribunal came to 163 TMC dependable water and 135 TMC surplus water.

The Tribunal allocated the Krishna waters amongst the three riparian states in the following way: a) Maharashtra: 585 TMC at 75% dependability, with return flows; 46 TMC at 65% dependability, including 3 TMC for minimum flows; 35 TMC out of surplus flows, and the total allocation comes to 666 TMC; b) Karnataka: 734 TMC at 75% dependability, with return flows; 72 TMC at 65% dependability, including 7 TMC for minimum flows; 105 TMC out of surplus flows, and the total allocation comes to 911 TMC; and c) Andhra Pradesh: 811 TMC at 75% dependability, with return flows; 45 TMC at 65% dependability, including 6 TMC for minimum flows; 145 TMC out of surplus flows, and, the total comes to 1001 TMC.

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[7] The earlier Tribunal had allowed 150 TMC water as carryover storage in Nagarjunasagar Dam and Srisailam Dam. The present Tribunal ruled that this 150 TMC is over and above the 800 TMC allocated by the earlier Tribunal at 75% dependability and should come from the "surplus water".

The Almatti dam and the 2006 floods

The Almatti dam is part of the Upper Krishna Project (UKP), across the river Krishna, envisaged to provide irrigation to the drought-prone areas of Bijapur, Bagalkot, Gulbarga, Raichur and Koppal Districts of Karnataka. The first stage of the project has two dams: 1) the Almatti dam across the river Krishna, near Almatti village in Bagewadi taluk of Bijapur district with a rigid crest level of 509.02 M and radial type crest gates of size 15.00 M x 15.24 M for storing water up to R L 512.20 M; and, 2) another dam across the river Krishna, at Narayanapur (downstream of Almatti Dam) near Bachihal and Siddapur village in Muddebihal taluk of Bijapur district. In the second stage of the project it is envisaged to raise the FRL of Almatti Dam to 524.26 M to utilise further quantum of 1907 Mm^3 (54 TMC). The Almatti dam has been controversial right from the beginning, and the downstream state of Andhra Pradesh has had serious objections to the height of the dam.

However, a few years back, the Almatti came into the limelight for a very different reason altogether. This was in 2006 when there was a massive flood in the Krishna, and nearly half of Sangli, an upstream city in Maharashtra, went under water resulting in an unprecedented blame game between Maharashtra and Karnataka. The politicians (and also partially the bureaucrats in the Water Resources Department) in Maharashtra blamed the Almatti dam for the flood and the crisis as they felt the delayed opening of the gates at Almatti as the cause of the floods upstream. Their counterparts in Karnataka stoutly denied this allegation, and instead took up the viewpoint that it is the sudden releases of the water from upstream dams in Maharashtra that caused the floods at Almatti. The mainstream politicians from both the states used the 2006 Krishna floods for vote bank politics in their respective states.

The new Krishna Tribunal also looked into the issue of the height of the Almatti dam and the grievances from both Andhra Pradesh and Maharashtra. The grievance against the raising of the height of the Almatti Dam is "that of submergence of the territory of Maharashtra and that of the State of Andhra Pradesh, that if the height is allowed to be raised and more water is stored and utilised by the State of Karnataka, the inhabitants of the State

of Andhra Pradesh, which is the lowest riparian State, would suffer since the projects as planned at 75% dependability in accordance with the decision of KWDT-I would fail resulting in disaster to the State of Andhra Pradesh". After examining the evidence and witnesses from both Andhra Pradesh and Maharashtra, and the counter-arguments from Karnataka, the Tribunal gave the following verdict: "in view of the discussion held above, we decide the issue in affirmative to the extent that State of Karnataka is entitled to storage of water up to the level of 524.256 m in Almatti Reservoir and in negative to the extent that height of Almatti Dam may be restricted at 515 m as claimed by Andhra Pradesh or 512 m as claimed by Maharashtra" (Krishna Water Disputes Tribunal 2010).

Notwithstanding the allegations and counter-allegations, the example of the 2006 floods, and the verdict of the Tribunal bring out critical issues with regard to dams in an interstate context. Floods are a phenomenon of concern in all basins, though the regularity with which they occur and their severity may vary. Moreover, it is important to note that the severest cases in all basins tend to be similar. Therefore, it should be emphasised that all dams in a basin must additionally be analysed from the viewpoint of flood control before their reservoir operations are finalised. Unfortunately, this aspect is given very little consideration in reservoir operation plans, except for those dams that have been specifically assigned the function of flood control. The important issue here is that floods affect and are affected by *every* dam.

In this context, it should be noted that there is very little coordination between dams and their reservoir operation plans across states, and even to a large extent within states as well. Upstream-downstream co-ordination is vital in the case of flood control. There is not even exchange of data between states about riparian flows, and we find the states and the Central Water Commission (CWC) in dispute about the validity of data. In such a situation each dam is planned in its own way giving central focus to irrigation or water supply in general. While this may not seem to be having a negative impact in normal years, in years of excessive rains, or intensive spells of rains, the negative impact becomes apparent. In normal years the tendency, and rightly so, is to store as much of the water as early as possible so as to have

an assured supply on hand. However, this also means that we reduce flood cushioning capacity as early as possible, and leave ourselves vulnerable in not so normal years.

The need for a coordinated basin plan across states in any given basin is evident on many other counts as well, but there is no political will to build an agency that can carry out this function. The stipulated River Basin Organisations (RBOs) have not even been formed, let alone being functional. Even within states, we do not find effective coordination within a basin. This is a major governance deficit that we need to speedily rectify.

4. The Mullaperiyar dam

The case of Mullaperiyar is different from the other two cases in two ways: first, there is no question of riparianism here as Tamil Nadu is not a riparian state[8]; and, second, the water was given to Tamil Nadu as part of a colonial agreement dating back to more than 100 years ago. The case also brings out for the first time the issue of dam safety in the context of interstate water allocations.

The Periyar lease deed of 1886 is perhaps the first formal interstate water sharing agreement between two states in India. During the last decades of the nineteenth century, European explorers identified the abundance of water in the upper Periyar reaches available for easy diversion to the eastern Madurai district. The lease deed that resulted in the construction of Mullaperiyar dam was signed between the erstwhile Madras Presidency, and the state of Travancore. The deed allowed Madras to construct the Mullaperiyar dam, and, to store and divert the yield from the river for the use of the state. More than 8,000 acres of land was leased to Madras Presidency for this purpose as per the Agreement. Not only the land, but also all the waters, (flowing into, through, over, or from the said tract) in this area, the right to passage and fishing rights were totally granted to the lessee. Accordingly, the Mullaperiyar dam was commissioned in 1895 with a length of 360m for the main dam and 73m for the subsidiary dam with a height of 47.24 m, a catchment area of 648 sq.km, and water spread area of about 29

[8] A miniscule portion of the basin is technically in Tamil Nadu, but it is hardly enough to qualify it as a riparian state.

sq.km. An amount of Rs.5/acre was fixed as the lease amount to be paid to Travancore. The said amount was not paid in cash to the state of Travancore. Instead, it was adjusted towards the royalty to be paid by Travancore to the British presidency. The lease deed was valid for a period of 999 years. The reservoir with a gross storage capacity of 15.6 TMC (443.55 Mm^3) feeds an *ayacut* of 88,000 ha in Tamil Nadu.

Water from Mullaperiyar is being used for irrigation mainly in Madurai and Ramanathapuram districts of Tamil Nadu. Since 1964, water thus diverted is used for power generation as well (at lower camp powerhouse with 140 MW installed capacity) despite objections by Kerala, and in violation of an award in favour of Kerala sustaining the state's objections. After independence, the states of Kerala and Tamil Nadu informally agreed to continue the water transfer. In 1970, the two states signed a fresh deed retaining most of the original conditions. The lease rent was revised upwards to Rs.30/acre but it was a very small increase considering the fact that 85 years had elapsed since the original agreement. In the new agreement, power generation by Tamil Nadu was legalised. According to the new agreement, Tamil Nadu is to pay Rs.12/kw-year[9] up to a generation of 350 MU and Rs.18/kw-year for generation above 350 MU annually. The present agreement is also for a period of 999 years with a provision for revising only the lease amount once in 30 years.

In 1979, leaks were detected in the Mullaperiyar dam, which triggered long-drawn debates and arguments over the legalities and the safety of the almost century-old masonry dam structure. Following detection of leaks, a team appointed by the Central Water Commission recommended the lowering of the reservoir level to 136 feet from 142.40 feet along with leak proofing as a precautionary measure against possible dam failure. The team suggested maintaining the height of water at 136 feet until completion of dam strengthening works by Tamil Nadu after which they suggested that it could later be raised to 152 feet in three stages.

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[9] A kilo watt year is calculated as 8760 units or kilo watt hours.

Since then the two Governments have remained in dispute over the issue of whether or not to raise the water level maintained all these years at 136 feet. The Government of Tamil Nadu has approached the Supreme Court questioning the order for reduction in water level.

Mullaperiyar is presently a burning issue in both the states. The main concern of the people of the state of Kerala is the safety of the 116 year old dam. This is also coupled with a general feeling of injustice that prevails in the state of Kerala with respect to interstate water sharing agreements with Tamil Nadu. Donating the entire quantity of water from a sub basin that is entirely within the state boundaries is considered by many as a mistake committed by the then state of Travancore that was compounded further by the Kerala state government and officials in the post-independence period. At the same time, people are not entirely against supplying water to Tamil Nadu as there is a general perception that the neighbouring state is water starved, and, is far ahead in effectively utilising available water resources. In Tamil Nadu where water is a highly sensitive political issue, the possibility of losing the presently available water and a violation of the treaty is the major concern.

While Tamil Nadu is keen on raising the height of the dam, Kerala is concerned about the failure of the dam which, if it so happens, would wash away three districts of the state. There is also a possible threat of seismic hazards[10], and impacts, on the Periyar Tiger reserve related to the increase in the height of water level. The dam, built with *Surky* (a mixture of lime, jaggery sand *etc*.) has far exceeded its expected life span. The internationally accepted life span of large dams is 50 years as set by the International Commission on Large Dams (ICOLD). Occasional mild earthquakes have also been felt in the region during the past few years. This is adding to the safety concerns. In case the Mullaperiyar dam fails during monsoons and the gushing waters cause one of the dams of the downstream Idukki reservoir to breach too, then the resultant catastrophe could be beyond all imagination. Another aspect of the conflict that has to be considered is that the Government of Tamil Nadu has

[10] In 2011 the Mullaperiyar issue again flared up mainly because of a series of earthquakes and tremors in the influence area of the dam.

been able to divert the stipulated yield in most of the years even after reducing the water level. At the insistence of the Central Government, as mentioned above, the maximum water level in the dam was reduced from 152 feet to 136 feet as an interim arrangement. Nevertheless, in most years when the low water level was maintained, the amount of water flowing to Tamil Nadu, and the ayacut it serves, has not been reduced, and has even increased in some years. This is important, because, it shows that it is possible to deliver the stipulated amount of water to Tamil Nadu even with a lower dam height.

The dam height is being maintained at 136 feet for the past 30 years, even though occasionally the water level does reach 140 feet during high floods. Meanwhile, the government of Tamil Nadu carried out some strengthening measures at the dam, and, is claiming that the dam can safely hold water to its full capacity (152 feet). On the other side, considering the age of the dam, as well as the seepages from the dam, people of Kerala believe that even the present water level is not safe. The issue is being argued in the Supreme Court. In 2005, the Court ordered that the water level be raised up to 142 feet. The Government of Kerala then went ahead and formed a Dam Safety Authority that declared the dam unfit. The credibility of the Dam Safety Authority has been questioned by Tamil Nadu.

As discussed, when the matter came before the Supreme Court, during the hearing, the Court asked the two parties to explore the possibilities of a fresh joint study. While the state of Kerala agreed to the same, the Tamil Nadu government has expressed its unwillingness. It appointed a five member committee headed by Justice Anand. However, the court verdict whatever it may be, is not likely to be acceptable to both parties, and as such a permanent solution through a Court order seems to be a remote possibility.

Kerala proposes a new dam

Meanwhile the Government of Kerala is proposing a new dam about 1,300 feet below the present dam as a permanent solution to the issue. But the Tamil Nadu government claims that the present structure is safe enough, and there is no need for a new

dam. Even though the technical feasibility of the new dam has not been assessed properly, the new dam would involve additional submergence within the Periyar Tiger Reserve, and is likely to have very serious ecological consequences.

A long drawn-out agitation demanding a new dam and a new agreement took place at *Chappath* town downstream of Mullaperiyar. Meetings and seminars were held at other places in the state. The media also highlighted the Mullaperiyar issue especially during monsoon season. The Government of Kerala approached the Government of India with the recommendation to decommission the Mullaperiyar dam, and formed an MPs' forum for advocating the same.

Alternate possibilities

Serious discussions have also going on in the civil society in Kerala regarding the possibilities of alternate storage facilities in Tamil Nadu without reducing the share of water to Tamil Nadu. It is also learnt that the Government of Tamil Nadu is trying to create a series of storage facilities on its side which also needs to be explored.

Discussions are also going on about whether there are any chances for a dialogue and consensus based new agreement between the two states in which the main concerns of both the states (dam safety and water requirements in Tamil Nadu), and environmental flows of Periyar River can be mediated. The possibilities of a new law regarding the age of dams in India also needs to be explored in this context.

Initiatives of the 'Forum for policy dialogue' on water conflicts in India

Recently the Forum for Policy Dialogue in India attempted a dialogue between Kerala and Tamil Nadu on this issue to explore the possibility of reaching some sort of a middle ground. Though

Kerala participated wholeheartedly, Tamil Nadu did not[11]. But the discussions threw up certain ideas that could be taken up for further discussions around which one could attempt to initiate a dialogue.

The Forum further developed on these ideas when it made an appeal in 2011 to the Prime Minister of India to decisively intervene in the issue. The Forum decided to make this appeal in the background of the polarisation of views around the Mullaperiyar. The Tamil Nadu government insists that the Mullaperiyar dam is safe, and that the water level must be maintained at the maximum level as per the agreement. The Kerala government insists that a new dam, downstream of the present dam, must be built because the present dam is unsafe. There have been recent tremors with their epicentres near the dam. Trust between the two states has diminished to low levels. Rising fear and apprehension on both sides have created a grave situation needing immediate intervention and initiative at the level of the PM in getting the two parties together for a negotiated settlement.

The Forum also believes that the positions of both Tamil Nadu and Kerala are flawed and there is a need to think beyond them. The 116 years old Mullaperiyar dam shows all signs of the ravages of time. Expert opinion on the safety of the dam is divided. While there are experts who believe that the dam would be safe with certain repairs, others believe that the dam may be unsafe, based on hydrology studies as well as the technology and material used for dam construction. The dam is located in a seismically sensitive zone, and recently there have been a series of tremors with epicentres close to the dam.

On the other hand, the new dam which is being planned downstream with a larger storage capacity would create a heavy

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[11] The Forum organised the meeting on 4th August, 2009 to which MPs from Kerala and Tamil Nadu were invited and independent experts like Prof. R. Ramaswamy Iyer, Former Secretary, Ministry of Water Resources, Dr. Subash Chander, retired Prof. from IIT, Delhi and an international expert on dam safety and Prof. Brij Gopal, Retd Prof. JNU, Delhi were all present. Though from Kerala the then Minister of Water Resources, Mr. N. K. Premachandran, and many MPs participated in the meeting, unfortunately, irrespective of various efforts, nobody from Tamil Nadu participated.

financial burden, submerge a substantial additional portion of the Periyar Tiger Reserve, result in a massive permanent structure inside the Reserve, introduce massive interference and disturbance over the entire construction period, would be subject to the same problem of seismicity, and would cause additional environmental damage in Kerala to fulfil Tamil Nadu's requirements.

The Forum's appeal calls for certain immediate actions as well as a long term strategy to deal with the issue amicably.

Immediate action

Given intense fear and insecurity amongst the downstream people, divided expert opinion on dam safety at higher water levels, increasing seismic activity in the area, and increasing visible damage, it would be best to use the precautionary principle and keep water levels low, at around 120 feet. Water can be delivered to Tamil Nadu at 120 feet level, and Tamil Nadu should be encouraged to divert as much water as it can and store it inside Tamil Nadu in balancing reservoirs or other storages.

Long-term action

Long-term action needs reconfirming Kerala's commitment to provide the present quantum of water. The Kerala government in any case has publicly confirmed this commitment. Both the parties need to come to a common understanding regarding the role of the Mullaperiyar dam as a diversion dam rather than a storage dam, and that the storage capacity needed for Tamil Nadu should be created inside Tamil Nadu, with adequate assistance from the Centre.

Studies need to be undertaken immediately on a) the requisite capacity needed inside Tamil Nadu, b) the redesign of the diversion and conveyance system, c) on the basis of the redesign minimising storage behind the dam as close as possible to the minimum regulatory storage required, d) measures to strengthen the dam at the new level, e) hydrological study of flow at dam site, and a schedule for the regulatory storage, and f) working out arrangements in the transition phase.

Though the dam would continue to be in the control of Tamil Nadu, we suggest that there should be a tri-partite board consisting of representatives of Government of Kerala, Government of Tamil Nadu and the Union Government (on the lines of the Tungabhadra Board) that oversees the preparation of a reservoir operation plan and monitors and modifies it throughout the year.

The Forum thinks that this would be a just and optimal solution and would be financially and economically more viable. The measures above are based on what the Forum thinks is the *minimum* that would be able to resolve the conflict. Further optimisation is possible in many ways. For example, a strategy of local water harvesting and increase of on field and irrigation efficiency so as to gradually reduce the requirement from the Mullaperiyar allowing its eventual decommissioning. In fact, we should ultimately move to ecosystem-based river basin planning.

Apart from the question of dam safety, which is a critical issue from the point of view of the downstream state and of downstream people, the question of whether the interstate water sharing agreements that have been part of the colonial rule have to be reviewed (or revoked), and fresh agreements worked out, has gained currency. This should have been done after independence, especially after re-organisation of the states.

5. In conclusion: some reflections on interstate disputes and dams

Each of the three cases described above has a long history, and each would require considerable space to bring out all the facets of the conflicts. The conflicts are ongoing and every passing day adds to the developments around them. The brief descriptions we have provided above are meant to be neither exhaustive nor comprehensive. The descriptions are meant to provide us with a background on which we can discuss some of the salient issues related to interstate water conflicts. In this section we shall try and bring the discussion around to some of the important implications they have for resolving and managing interstate conflicts.

Of the three cases, in two of them, the SSP and the Almatti dam, the conflict is framed by Tribunal Awards (the NWDT and the KWDT-I and KWDT-II Awards). In the case of Mullaperiyar dam, the conflict is framed by an interstate treaty going back to the late nineteenth century. Interestingly, in all of them, the dam height is an issue. And, in all the three cases, the argument of one party (Gujarat in SSP, Tamil Nadu in Mullaperiyar and Karnataka in the case of Almatti) has insisted on a specified dam height by virtue of tribunal awards, and/or the treaty, and subsequent judgements.

The problem is that the manner in which the height of the dams was fixed had led to a situation where other important alternatives that could resolve the conflict in a win-win manner cannot even be considered. In the case of the SSP and Mullaperiyar, alternatives have been suggested with lowered heights that also ensure the allocation of water made under the Tribunal Awards. In that sense, they remain true to the spirit of the Awards and treaties even while violating some aspect of it. Technology related to physical infrastructure as well as its management is rapidly changing and many options that were not viable in 1896 and 1979 are now possible. Should the states not have the freedom to avail themselves of these possibilities and mutually discuss how best to satisfy their needs in the spirit of the Awards? At present, the tribunals are not sufficiently self-aware of their own historical location, and do not incorporate this spirit into their awards. In fact, what is happening right now is that while there has been a sea change in ideas and technologies of water management over the last fifty or so years, our Awards and the legal apparatus remain mired in ideas that the world has already outgrown. One consequence of this has been an increase in water conflicts, and a hardening of the legal attitude from the party which is apprehensive of losing.

Sharing surpluses and shortages

A similar situation exists with respect to the sharing of surpluses and shortages. The tribunals and awards generally confine themselves to allocating water at a specified level of

dependability, generally 75%[12]. However, water is not a fixed resource like other resources, but is dynamic in nature, varying over time. An actual year is always likely to be a surplus year or a deficit year in comparison with the water availability assumed by the tribunal. In years of plenty, it may possibly not lead to conflicts, though the issue of floods discussed above shows otherwise. But, in a deficit year we are bound to have a conflict. It is, therefore, important to have awards specify how to share the surpluses and shortages. It is also important to realise that these need not be shared proportionally, for example, in deficit years it may be important to share them in proportion of basic needs, whereas in surplus years it may be more a matter of flood mitigation and optimal economic exploitation.

Unfortunately, tribunals have not been found to go into these matters. They often rest content with the allocation at a given level of dependability, the interesting case is that of Scheme B in the KWDT Award which is somewhat of an exception. Equally interesting is the fact that it was shelved, because it *did not fall within the purview of the ISWD Act*. This is another important element in the mix. The tribunals also have been bound by the structure of the constitution, which does not allow pro-active intrusion into water management for the states in the part of supra-state bodies. This is a point that we shall take up a little later.

Interstate competition

Dams soon become instruments of interstate competition as the contending states begin to place more and more demands on them. This is quite obvious in the case of the SSP which evolved from a small structure proposed at another site to the 138 m mammoth that it is now. It would be an interesting story of how the competitive demands placed by the states complemented the gigantism of the technocracy to create the mammoth SSP on the Narmada. However, that is another story, and should be told elsewhere. This issue of competition is again illustrated by the KWDT award. The 1973 award had left the issue of unutilised

[12] In the case of the Krishna Tribunal – II the dependability has been brought down to 65%.

share by the states open for re-negotiation on 31 May 2000. This led to a spree of dam building in Maharashtra in the 1990s because utilisation was conveniently equated with storage which was then conveniently equated to dams. No distribution systems were built; farmers were supposed to pick up the releases from downstream points. And, very little attention was paid to needs of resettlement. The argument was that RandR issues were unnecessarily holding up dam construction, and could lead to loss of Maharashtra's share. It was against this backdrop that we have a strong movement of the dam-affected emerging in South Maharashtra in the 1990s.

Environmental flows

Though many countries across the world have increasingly recognised the need for maintaining environmental flows, and have put appropriate protocols to implement it[13], the same cannot be said of India. Our mindset still seems to be one that sees water flowing to the sea as a waste, and our efforts have been to store and utilise every drop of water. First and foremost, this mindset has to change. The important thing to realise here is that ensuring these flows can, apart from meeting ecosystem needs, also to some extent meet other needs like basic needs, livelihood needs, and socio-cultural needs, especially for downstream communities. Proper prioritisation of water uses that gives second priority to ecosystem needs can also go a long way in ensuring environmental flows (Joy *et al*. 2011). If we have to ensure environmental flows, we need to address some of the following issues.

In the context of India, dams and diversions have been the main culprits for fragmenting our river systems, thus, affecting the downstream ecosystems and livelihoods of people. It is time that we take a hard look at dam building in the country. The planning of water resource development and matching it with

[13] For example Australia has adopted and put in place twelve national principles to ensure allocation of water to ecosystems. For details see Chapter 3: 'Water for Ecosystems in Joy *et al*., 2011, Life, Livelihoods, Ecosystems, Culture: Entitlements and Allocations of Water for Competing Uses', (position paper by the thematic sub-group on Water Entitlements and Allocations for Livelihoods and Ecosystems Needs), Pune: Forum for Policy Dialogue on Water Conflicts in India.

basic and livelihood needs of the local people needs to start at the lowest hydrological unit, which is a micro-watershed, applying the principle of 'subsidiarity'. Only if these needs cannot be met by harvesting water from the micro-watersheds should water from a higher hydrological unit be harvested. This way one can also build up sub-basin and basin plans, taking into account the prioritisation of water uses as discussed earlier in this chapter. As far as possible, efforts should be made for *in situ* water conservation and use, and for reducing evaporation and increasing conversion into biomass, the cardinal principle of watershed based development. This can reduce the need for stored water. Of course, this is not to say that we do not need storages, or that we do not need dams. We do need storages and dams, especially because we have very clearly defined short monsoons and long dry spells. The issue is how we do it without creating too much destructive submergence and negative downstream impacts. As discussed in the section on SSP above, the issue of integration of various kinds of water resources – small and large, groundwater and surface water – becomes critical. The water sector discourse in the country has been highly polarised on this issue, posed as one of large versus small. Integration can help go beyond the limits of both the small and the large. We also need to realise that there are regions in the country that need, along with local water resource development through watershed development efforts, some supplementary exogenous water to stabilise their livelihoods. It is also possible to tap large water sources (not necessarily large dams) without creating large destructive submergence, and ensuring unbound post monsoon flows (Paranjape and Joy 1995). This is an issue that needs wider debate, and the sooner we come to a collective understanding the better it is for our people (in terms of meeting their livelihoods) and our ecosystems.

Environmental flows are not 'residuals'

The awards given by various tribunals set up to settle disputes over water sharing of interstate rivers are a good examples of how water allocations are made in this country. The entire flow at a particular dependability is allocated amongst the riparian states, and once each of the riparian states utilises its share of water, there is nothing left in the system. There are already many

closed basins in our country. Environmental flows are very often worked out as 'residual', meaning that allocations are made to all other uses and if there is anything left over then that is considered as the environmental flow. The Krishna is one example, where the entire water has already been allocated or committed to different uses, and the water does not reach the sea. Probably recognising this, the 2010 Krishna Tribunal Award provides for a total of 16 TMC water (in fact from the allocations made to the three states) out of a total of 2293 TMC (at 65% dependability) for environmental flows and this comes to only about 0.70%. This needs to change, and as per the order of priorities discussed earlier, after working out the requirements for the water for basic needs, water must be allocated for ecosystem needs and livelihood needs, and only afterwards can water for other needs be provided.

Regulated and non-regulated rivers

We have to adopt different approaches with regard to the highly dammed and regulated rivers, and rivers which are not as yet so regulated. In the case of the latter, we can follow the same process of allocation discussed above. However, in the case of the former, we may also have to look at options of increasing efficiency of the present uses, and allow the saved water to remain with the streams and rivers, thus contributing to increased flows. The second option could be to work out reservoir operation models that allow for larger releases, especially in the post-monsoon period.

Environment impact assessments and cumulative impact assessments

We need to critically look at environment impact assessments (EIAs) which are carried out and used only to justify projects. Firstly, processes involved in EIAs must be streamlined such that the entire exercise is made more scientific, objective, participatory and transparent, with the local communities having a decisive say. The second critical issue, which has come to the forefront in recent times, is the issue of having cumulative EIAs. Stand-alone EIAs around single projects can not capture the cumulative impacts caused by multiple projects planned in

the same river systems. This issue has become very critical in the context of the dam-building spree unleashed in the north-east, and many groups there have been demanding cumulative impact assessments.

Flood control and dam safety

There are two other issues which we need to take into account in any discussion about water allocations and water management today. These are flood control and dam safety as interrelated issues. Flood control had become an issue around the Almatti dam, and dam safety is a central issue in Mullaperiyar. While the importance of both has been acknowledged since the fifties, there has not been sufficient attention given to evolving procedures related to them at the basin and dam level. By providing storage and a buffering action through flood absorption, dams do provide flood control mechanisms. However, it is important to understand the limitations and conditions under which they operate.

For example, in normal years things would work as planned or designed. But in abnormal years it may not work as the timing of the heavy rainfall spells might coincide with a full storage, and might result in aggravating the situation. Also, the needs of agriculture, hydropower and other uses may clash with flood control needs. The Hirakud dam in Odisha is a classic example of this. Though it is a multi-purpose dam, the flood cushioning requirements are often in conflict with other requirements like agriculture and hydropower. Thus, if dams have to act as absorbents of floods, then there is a need for interstate coordination in every basin. This becomes even more important because of climate change, as it adds another layer of uncertainty. As a result of climate change, extreme events, abnormal patterns, and short spells with high intensity rainfall would increase. This would also call for strengthening of dam safety panels[14] in view of abnormal situations and also for greater control over river zones.

[14] Only some of the states have dam safety panels, and it should be made compulsory for every state to have dam safety panels. There should be proper coordination amongst the dam safety panels within the same basin.

Generic issues underlying interstate issues

Interstate water disputes often embody generic issues. The dispute between Karnataka and Tamil Nadu over Cauvery waters is also about upstream-downstream issues which are of a generic nature, and are not specific to a particular state or states. For example, if Karnataka was Punjab and Tamil Nadu was Haryana the issue would still be there. In fact, the issue becomes tractable if the dispute is framed more as a generic issue (like upstream-downstream issue in this case), as this will help us address the issues at heart, and the additional overlay of state animosities will be defused in favour of resolution. Competitive and populist politics at the state level definitely work as an obstacle as one witnessed in the case of Bhabli on river Godavari – a simmering conflict between Maharashtra and Andhra Pradesh. Mr. Chandrababu Naidu, the Chief Minister of Andhra Pradesh, has earlier used this as a political plank to consolidate his political constituency (Gujja *et al.* 2010). However, this is not to deny that there are no state-specific issues. In the case of Mullaperiyar there is definitely a deep sense of historical injustice which is also associated with an extreme sense of insecurity. But it all depends on how we go about it. If Kerala plays only on this historic injustice card then probably it would be next to impossible to find middle ground or a negotiated settlement of the dispute.

The problem is twofold – one that the tribunals share the viewpoint of the present legal regime around water which treats water mainly as property (and water for life, livelihoods, ecosystem needs, and the commons nature of water, *etc*., are still on the periphery of the legal framework) and then apportioning or dividing this "property" becomes the main preoccupation. This whole approach is embedded in an adversarial litigation framework. For example, even after the Cauvery Tribunal gave its final verdict, all the contending parties went to the Supreme Court. However, water is not a private property in the classical sense, because of its bio-physical and socio-cultural peculiarities as a resource. Water is a common pool and shared resource to be managed by the contending states. This calls for a change in mindsets and approaches.

The second point is that the issue of sharing water is not limited between states; the issue is very much relevant to what

is happening with the states as well. If a particular state gets its share of water, or sometimes even a higher share than what is due to it in the name of drought, then the issue of how this water gets utilised, and how is it distributed across different regions within that state becomes very important. In the case of Narmada waters, Gujarat was allocated a disproportionately higher share of 9 MAF of water on the grounds that regions like Kutch, Saurashtra and North Gujarat are severely drought-prone. However, the water distribution plan of SSP shows that bulk of the water would flow into the central part of Gujarat which is already highly irrigated. For the moment, if we think that these regions are not part of Gujarat then would they have the same attitude to SSP water and its allocation as they have presently? We do need a common set of principles that can apply not only to water allocation and sharing between states but also within states.

Will states adhere to such guidelines?

The crucial issue is whether such guidelines will ever be followed by the states as water, exempting interstate water issues, is primarily a subject for legislation at the level of the provincial states in India. One way out is to have a water framework law or directive, in the lines of the European Water Directive. However, the EU Water Directive is much more stringent in scope in imposing limits, targets and tasks for the national states to carry out. The proposed Water Framework Law however places no such obligations on the states. What it is supposed to do is to lay out detailed principles and approaches that water legislation and governance in the states must conform to. The states are free to craft legislation and institutions according to their specific needs so long as they conform to those principles.

The Planning Commission's Working Group on Water Governance for the Twelfth Plan had set up a Sub-Group on a National Water Framework Law chaired by Professor Ramaswamy Iyer. The Sub- Group has recently submitted the draft National Water Framework Act [15]. This draft comprises a

[15] The Draft National Water Framework Act has been prepared by the Sub Group consisting of Ramaswamy R. Iyer, (Chairperson), Philippe Cullet, K. J. Joy, K. C. Sivaramakrishnan, Videh Upadhyay, M. S. Vani and assisted by Mahadevan Ramaswamy set up by the Planning Commission's Working

comprehensive set of principles related to water meant to guide all legislation on water.

In fact, the definitions section in the draft is a succinct, comprehensive statement of principles covering all major issues related to the legal and institutional framework around water. Reading through the draft, it becomes clear that because the draft is a set of principles, it does not in any way bar the states from evolving a legal and institutional framework appropriate to their specific needs. In fact, it should be seen as an enabling rather than a restrictive legislation.

What is the use, it may be asked, in putting together a set of principles when they have been put forward so many times by so many people? The value lies in its being an Act, and, therefore, in that the legislation on water whether by the States or the Union would then become accountable. It would be possible to go to court if it was found that the States were not following them in either their legislations or in their practices. The enunciation of principles as an Act has this advantage.

The draft has also devised a good strategy for its application to States. The legislation does not automatically become statutorily binding on all States. It comes into force only in those States that pass the Act or assent to the Act by the prescribed procedure and majority in their legislatures. This gives the freedom to States to think over the Act and adopt it only when they are ready to do so. This could make it much more acceptable to the States.

Legal changes must be complemented with changes in governance institutions

Access to reliable data, stakeholder involvement and nested institutions are all pre-requisites for legal changes to work. However presently these exist only on paper. Since the states vary about having one River Basin Organisation for the entire basin,

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Group on Water Governance for the Twelfth Plan. It is available on http://planningcommission.nic.in/aboutus/committee/index.php?about=12strindx.htm#wr, last accessed on 23/03/2012.

it may be better to start with nested RBOs at the state level, and then federate the state level RBOs into one RBO. The institutions at various levels should be multi-stakeholder platforms in the true sense, representative of all stakeholders.

For MSPs such as the nested basin institutions to become meaningful, stable institutions of water governance, they will need to take proper account of the heterogeneity of stakeholders, prior rights, the historical context of MSP formation, the complexity of issues surrounding water as a resource, an innovative approach to water sector reform that will allow accommodation of different stakeholder interests, access to reliable data, information and decision support systems, and, lastly, the presence of a committed support and resource agency.

Heterogeneity includes *both* horizontal difference and vertical differentiation and exploitation, and these need to be tackled differently, mainly by a proactive approach in favour of the exploited and the oppressed. There are also other forms of inequality that need attention: informational and spatial asymmetry, differences in closeness to power and the state, different levels of organisation, differing numerical strength, bargaining power and access to resources, to information and to legal or other remedial actions. The issue is that of creating a level playing field so that different stakeholders can participate in the process on an equal footing.

How does this apply to interstate matters? At the moment we have a situation in which a supposedly ideal solution has been mandated -- that of a river basin organisation as a supra-state body. However, given that water is a state subject, no supra-states body may be expected to function. It will be a toothless entity if it ever does come into existence. What we need is a strategy that takes this into account.

It should be possible to make it mandatory for each state to have a state basin organisation of the type described above, as a nested set of institutions from micro-watershed to basin level within each state. We then have a River Basin Co-ordination Agency or a similar body in which the state-level basin agencies meet, negotiate and co-ordinate their activities from time to

time. It should be clearly recognised that the Basin Agency is not a supra-states body, but a forum for facilitating interstate coordination, cooperation and negotiation. At present, we have bodies where disputes can be brought up, but, none where issues of cooperation and coordination can be brought up. If we give these bodies a real chance, if we succeed in building institutions that treat our rivers as common resources that we need to preserve and share rather than property that we must claim and divide, we may then realise that rivers do and can join us, and need not always divide us.

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Struggle for 'blue gold' in Plachimada, Kerala

Patibandla Srikant

1. Introduction

Development – particularly industrial growth – has involved the use and control of nature and the environment. The negative impact of such use in terms of environmental degradation was ignored for a long time. Development was seen as central for human beings, while environmental concerns were regarded as peripheral (Krishna 1996: 32). Major stress was laid on industrialisation, trade and urbanisation as symbols of growth, progress and overall development. Thus, the newly independent countries aimed at transforming from agrarian to industrial economies as a path to development (Andharia and Sengupta 1998: 423). All the nation-states – those in the Western bloc, those in the Socialist bloc, and the developing countries – viewed this form of growth as central to their development process. Nation-states looked at natural resources as a key to economic growth through which the status of 'super-power' can be achieved. In this process, environment was considered as 'economic resource' that is there for human beings to exploit (Heywood 1998: 265).

India for far too long has been ignoring the environment-development link in its hurry to achieve targeted economic growth in the name of development. Construction of large dams, mining of minerals, mega-industries, among others, have all been in progress in the name of achieving development, while on the contrary the people at the local level have been alienated from their natural surroundings and resources. This alienation further led to major struggles in safeguarding the environment by anchoring it in the concept of development. These struggles surrounding the livelihood aspects of people in India have come to be termed as environment movements (Shah 2004: 250). There emerged environment movements in India surrounding various issues. Water is one of the most important issues that many of these movements have been based upon. The 'Blue Gold' (Barlow and Clarke 2002) has become one of the most contested resources in the contemporary world. The issues regarding 'Blue Gold'

range from access to quality to equity to allocation to control. Often these issues surrounding water are very intricately linked with the livelihoods of people.

In the above backdrop, the present paper discusses one such case study of people's struggle in Plachimada village of Kerala for groundwater. Groundwater in this area was depleted and polluted due to heavy extraction by a multinational beverage company located in this area. The struggle for groundwater and the issues involved in such a struggle are discussed in this paper. The first section gives a brief introduction to water conflicts in India. The socio-economic background of the movement is discussed in the second part, while the third part discusses the movement in detail. Other larger issues associated with the movement are discussed in the fourth part, while the fifth section provides some concluding remarks.

2. Water conflicts in India

In recent times, state-pursued development has become a major bone of contention in India. With dwindling resources such as water and land, the conflicts are only increasing. Many such important conflicts are surrounding water, and range from micro-level conflicts to regional conflicts to interstate conflicts. Some of the major axes of conflicts with regard to water are vis-a-vis equitable access, competing uses, water quality and available quantity, tension over dam construction and displacement, privatisation and inter-boundary/state conflicts (Paranjape and Joy 2011). The conflicts surrounding water ranges from river water sharing, construction of big dams on rivers, irrigation facilities, institutional mechanisms, water pollution, groundwater depletion, pricing of water, quantity and quality of water, and many other related issues.

Resource conflicts in general, and conflicts over water in particular, are not new. Water is listed under Entry 56 of the Union List, and Entry 17 of the State List in the Constitution of India. Water is in both the lists, and not in the Concurrent List. This in itself has led to tensions between the state governments and the central government. In addition to the centre and the state, there is an additional third tier added through the 73rd and the 74th amendments. The Eleventh and Twelfth Schedules of the

Constitution mentions that drinking water, water management, watershed development, among others, need to be devolved to the panchayats (village-level governing bodies) and nagarpalikas (town/city governing bodies) (Iyer 2003; pp. 21-23).

Sharing of water has been a major bone of contention in India. Sharing of the water of Cauvery River between Tamil Nadu and Karnataka continues to create tensions. Similarly, sharing of water of Godavari River continues to create conflicts between Andhra Pradesh and Maharashtra. The water of River Krishna River continues to be a bone of contention between Andhra Pradesh and Karnataka. In addition to conflicts over river water sharing, there are other conflicts related to dams. For instance, the recent tension between Tamil Nadu and Kerala over the Mullaperiyar Dam has brought such issues to the forefront. While such conflicts are between the federal states triggering sub-national aspirations of the people, there are other struggles where communities and the state are often pitched against each other.

The state, often in the name of development, envisages large dams, which in turn leads to large scale displacement of people and their livelihoods. This in turn fuels people's resistance. One such instance is the case of Narmada Bachao Andolan (NBA), which has been struggling against big dams on River Narmada, and for proper resettlement and rehabilitation of the displaced people. There is regular tension in many urban areas with regard to access to water, quality of water and quantity of water. Conflicts surrounding channelising water to urban areas have become common. For instance, in 2004, villagers near Veeranam Lake in Tamil Nadu rose against the diversion of water for Chennai City. Similarly, in 2005, villagers from Tonk in Rajasthan fought against diverting water of Bisalpur dam for Jaipur. In the rural areas, the advent of rig technology to extract groundwater for irrigation purposes by big farmers has often created social tensions between big farmers and small farmers who find it difficult to afford bore-dug wells.

Since the year 2008, more than a thousand water-related violent conflicts have been reported (Chauhan 2012). Further, another type of water-related conflict is water diverted for industrial use and purposes. In Sambalpur, Odisha, in 2007,

around 20,000 farmers fought to stop industries sourcing water from the Hirakud Dam. Again in 2010 in Vidarbha, Maharashtra, villagers protested against diversion of water to Sophia water plant. A similar case in Andhra Pradesh, Sompeta, led to the killing of two farmers over diverting water from an irrigation source for the Nagarjuna thermal power plant. It appears that many of these conflicts or tensions are rooted in issues surrounding livelihoods. Since, livelihood issues are at stake, it is natural for the communities to wage struggle. Such conflicts attempt to establish the rights of communities over water, and communities do this by articulating their demands in the language of rights.

3. Plachimada and the anti-Coca Cola movement

Coca Cola of America re-entered India in 1993 after it was expelled in 1977. Coca Cola in India registered as Hindustan Coca-Cola Beverages Private Limited (HCBPL) as a subsidiary of Coca-Cola in Atlanta. The HCBPL established its factory at Plachimada in Moolathara village of Perumatty panchayat. This panchayat falls within the Chittoor taluk of Palakkad district in Kerala. The plant is located in the south-eastern part of the district bordering Tamil Nadu. In 1998 the company acquired 34.64 acres, largely paddy fields, and applied for a license on October 8th, 1999 for setting up a bottling plant in Plachimada. Soon the Perumatty panchayat granted a licence to the company on January 25, 2000 (Bijoy 2006: p. 4333).

Socio-economic profile

Plachimada is located in the Chittoor taluk of Palakkad district. Palakkad has an area of 4,480 sq. kilometres and a population of 27, 84,767, with majority of the population living in rural areas. The urban population consists of only 12.49% of the total population (Bhandari and Kale 2007: 88). The density of the population is 584 per sq. kilometre, which is lower than the average of Kerala state (819 per sq. km). The literacy rate is 84% according to the 2001 census, which again is less than the state's average literacy rate. The district of Palakkad is located in the border of Kerala and Tamil Nadu. Plachimada is very close to the Tamil Nadu border with around 5 kilometres of distance from the nearest Tamil Nadu village. As a result, people from

Plachimada converse in both Tamil and Malayalam. Palakkad district is regarded as 'the granary of Kerala' due to its fertile land and paddy production. The principal occupation of this district is agriculture, where around 64% of the geographical area is cultivated, out of which food crops are cultivated in 80% of the land. Paddy is cultivated in 60% of the land (Wramner, 2004: 25). Other cash crops that are grown are coconut, groundnut, cotton, sugarcane, pepper, banana and cashew nut (Kumar 2003: 18).

Plachimada is situated about 30 kilometres from Palakkad town, and falls under the Perumatty panchayat limits. Chitoorpuzha river runs about two kilometres from the village, while Molanthoodu irrigation canal of Meenkara dam is south of the village at a distance of around three kilometres. Majority of the villagers belong to Schedule Tribes and Schedule Castes. There are around a thousand households that belong to the Malasar community, and around 19 households belong to the Eravalars. A large majority of them earn their livelihood as farm labourers, while around 20% of them earn their livelihoods from other labour activities.

Coca cola built its plant on a 15 hectare plot, which was earlier multi-cropped paddy land. The plant has a working capacity of 1,500,000 litres water-based product with around 85 truckloads of soft drinks and mineral water, with each carrying approximately 600 cases, with each containing 24 bottles sized 300 ml to two litres. Sixty bore-wells and two open ponds were used to extract water for production purposes. The factory has 70 permanent employees, and approximately 150-250 casual labourers are also employed depending upon the season (Jananeethi Report 2003: 4).

The movement

The company started in early 2000, and slowly the villagers surrounding the plant started noticing changes in the groundwater levels. The groundwater table was simultaneously polluted, and water-level in the wells around the plant area had gone down. The local people blame it on irresponsible pumping of groundwater by the company, which they say has also affected farming activities. The effluents of the company were released into farm lands in the name of 'fertiliser', which again affected

the crops and fertility of the soil. The fertilisers supplied by the company to farmers contained high levels of cadmium and lead. These two factors impacted adversely on the livelihoods of people of the Plachimada region. Mylamma, one of the leaders of the Plachimada anti-Coca-Cola movement, explains the adverse impact as:

> They came to our village with glittering offers; that our people would get many job opportunities in the plant; the overall development of our village would be taken care of; the economic growth of the area would be strengthened *etc*. We waited and waited… nothing miraculous happened. On the contrary, six months went by, slowly we started facing the adverse effects. Except a few, nobody from the locality was given jobs. The water level in the wells of the surrounding colonies showed a sharp depletion. The quality of water – its odour, taste, hardness – got worsened. It became non-potable. We stopped using it. We were forced to fetch water from a distance of three to five kilometers. Several uncommon diseases started showing their neck out. The farmers around the plant stopped cultivation due to severe shortage of water. This was another thunderbolt on us that took away our daily little earnings. We were forced to migrate to faraway lands, seeking for some work or other to make our living. Suddenly we felt terribly helpless, facing the fact that we were being robbed. Our precious water resource had been stolen…lakhs of liters every day… Where would I get some fresh and pure drinking water anymore? How many kilometers should we have to walk to fetch a drop of water? Who will compensate the heavy loss incurred upon us by this giant plant? (www.plachimada.wordpress.com, downloaded on 2-02-08).

The region is largely populated by adivasis, and is dependent upon rain-fed water. Thus, in this backdrop, the people of this region rose against the company in 2002, and led a prolonged struggle, leading to the closure of the company.

In January 2002, a symbolic protest was held against the Coca Cola factory in Plachimada. On April 22nd the same year a campaign was launched against the company with nearly 2000 demonstrators sitting on a *dharna* outside the factory. During this demonstration several activists were arrested. The government and mainstream political parties defended the company on the

grounds that it creates employment. Soon after this, a protest rally was organised in which around 130 people were arrested. In August, a thousand people marched from Pallimukku, which is six kilometers away from Plachimada, and concluded with a public meeting in Plachimada. By April 2003, the license of the company came to the Perumatty panchayat for renewal. The panchayat instead of renewing the license issued a notice to HCBPL to which the company filed a petition in the High Court of Kerala. Finally the HCBPL approached the Local Self Government Department (LSGD) after the High Court of Kerala directed it to approach the appropriate authority. The BBC Radio 4 visited Plachimada, and found toxins in the fertilisers that were given to the farmers by the company. The movement celebrated one year of its struggle against Coca-Cola in 2003 by holding a huge rally, and delivered an ultimatum to the company.

Meanwhile, Delhi based Centre for Science and Environment (CSE) found pesticides and residues in soft drinks manufactured by Coca Cola and Pepsi. Basing on this report, Kerala Pollution Control Board ordered an investigation into heavy metals in sludge from the factory. At around the same time the Perumatty panchayat issued a second notice to the company upon which the company filed a second petition in the High Court. In October 2003, LSGD, in an interim order, questioned the authority of the panchayat to cancel the license of the Coca-Cola Company, and directed the panchayat to form a committee of experts. In the same month, the panchayat filed a writ petition in the High Court of Kerala. Finally on December 16th of the same year the court directed the panchayat to renew the license provided the company finds sources of water other than groundwater. It also stated that only the groundwater corresponding to the normal use equivalent to the land area could be used. In January 2004, World Water Conference brought global activists to Plachimada in support of the movement. In 2004, the division bench permitted the company to use groundwater on the condition that it should install meters for all its wells, and allow the inquiry committee to monitor the readings. Finally, in February 2004, the government banned the company from drawing groundwater. In March same year, the company suspended its operations in Plachimada, and currently the plant has closed all its production operations.

The movement formed Plachimada Coca Cola Virudha Samara Samathy (PCCVSS) – Plachimada Federation for Struggle against Coca Cola – as an umbrella organisation to fight Coca Cola. However, activists from outside Plachimada coming from all over Kerala formed an organisation called Plachimada Struggle Solidarity Committee (PSSC), with the main objective of providing solidarity to the Plachimada struggle against the Company. The movement raised a temporary thatched roof just opposite the factory's main gate across the road. The company employees also started a counter campaign against the movement by erecting another thatched roof next to the company main gate. The movement saw women leading in the forefront. Mylamma, a tribal woman, became the iconic symbol of Plachimada struggle until she died in 2006. One of the slogans that Mylamma gave – when you drink coke, you drink the blood of people – became very popular. One of the important demands of the movement has been to recognise water as a collective right. It demanded that the ownership of water should be under the authority of local communities. This demand acquires all the more significance particularly in the context that it has been made. All over the world there have been demands going on to privatise water in order to make more efficient and judicious use of water. The movement argued that water being a basic need for survival should be vested under the authority of local communities. To quote from a pamphlet of the movement:

Water is a basic survival need of all living beings, for their very existence. It is the elixir of life. Water is a natural right – a collective right to be enjoyed by all without prejudice, equitably and according to the needs. The exercise of this collective right over water entails absolute authority of communities over water resources. The translation of this authority is achieved by laws and institutions of governance forming the basis of conservation, sustainable use, preservation and development of water resources. This authority is to be exercised fully by the community with the assistance of the state. The community shall govern the water at the primary level.

The movement also networked with several like-minded national and international organisations, due to which the struggle for Plachimada came to be known across the world. At the same time, due to the parliamentary elections, and elections

to the state assembly, political parties were also forced to support the movement. However, the entry of mainstream political parties only strengthened the movement as the leadership was provided by the local people of Plachimada. CPI, CPI (M) and Janata Dal which were all opposition parties extended their support to the movement. This, in turn, put pressure on the ruling Congress party, due to which it banned the company from extracting groundwater in February 2004. Soon after CPI and CPI (M) entered the movement they viewed the movement as part of the wider anti-globalisation and anti-imperialist movement. Activists from other parts of the country visited Plachimada, and termed it as an environmental movement. The movement had also networked with many international organisations, which led to the banning of the company's products in many North American universities owing to its unethical practices in Plachimada.

4. Some issues

The notion of community right over water defies the mainstream logic of rights that are largely based on individualistic notions. However, on the other hand, there is also a danger in entirely vesting the authority of water rights with the community, as community may not be homogenous, and which might lead to the reimposition of traditional hierarchies, which may exclude some people of the community. The current development model requires a clear definition of individual-centric rights. Thus, the movement is also against the mainstream development paradigm as it articulated community rights, which goes against the spirit of the current development process. At the same time, the movement highlighted the need for regulating MNCs that come and invest in India in the hope of capturing the Indian market to make money. In this process, many of these companies violate the law of the land in many ways.

The government, on the other hand, in its enthusiasm to attract investment virtually leaves such MNCs out of legal scrutiny, all in the name of creating 'favourable environment for investments'. This struggle has also been one for greater decentralisation. It is the gram panchayat of Plachimada that took up the struggle to its logical conclusion by refusing to renew the licence to the company. The movement, by rooting

itself in a community-centric model of authority, implicitly made a demand for greater decentralisation. The Plachimada struggle is explicitly a struggle against privatisation. It is particularly against the privatisation of basic needs that are required for human survival. Thus, the movement, by emphasising on the larger issue of community ownership over natural resources, also implicitly advocated for self-governance. By questioning the authority of the Kerala government (read state), and that of the company (read market) over groundwater, the movement clearly indicated the assertion of community rights over natural resources.

The conception of water as a right helps to frame the discourse of rights against the state and the market (Iyer 2003: 80). Indian laws generally frame the ownership of groundwater as being attached to the ownership of land. There is no limit on how much groundwater a landowner can exploit (Singh 1991). However, if one goes by the above logic it implicitly means that the landless do not have any right to groundwater (Iyer 2003: 103). Iyer, further, argues that this kind of legal position will only increase existing inequities, and will also create new forms of inequities (*ibid*). While water has been considered a customary right, the assigning of property value to the same has written off the customary right, due to which many communities are fighting for their rights over water. When the local panchayat approached the Kerala High Court, a single judge-bench ruled it in favour of the panchayat by invoking the public trust doctrine. According to this, water as a natural resource is essential for life, and, thus, cannot be privately owned. Further, the ownership was to be held by the state in trust for the community (Iyer 2007: 136).

However, on an appeal by the Company, a division bench of the Kerala High Court ruled it in favour of the company by invoking land owner's ownership over water under the land (Iyer 2007: 136). One can see the clash between economic rights and basic rights – the company asserting property rights, while the people of Plachimada asserted their basic rights. The question raised in the context of Plachimada was this — is it possible to trade-off between basic rights that are traditional in nature with that of property rights that are modern in nature? In that sense Plachimada symbolises the conflict between the industry

and peasants. As Gadgil and Guha argue in another context, environmentalism originates in conflicts between competing groups over productive resources. As resource use intensifies, it undermines existing, subsistence-oriented economic activities. Here environmental conflict is for the most part, only another form of economic conflict (Gadgil and Guha 1995).

In India, most of the issues related to pollution are concentrated largely around the aspects of urban pollution. In this connection many issues related to pollution from rural region are largely marginalised and neglected. The struggle of the people from Plachimada brought the aspect of pollution to the forefront, wherein the company was letting its waste into agricultural land in the name of 'fertiliser'. The BBC in its survey found that this 'fertiliser' contained high levels of cadmium and lead, which badly affected the crops.

In most cases, people's struggles fail to achieve their objectives. Many of the struggles fade half way, while many others are accorded only minimum attention. Plachimada's success to a large extent remains not only as a struggle by people at the grassroots level, but also in networking with like-minded people within the country and elsewhere in the world. This resulted in a strong opposition in the USA as well. Educational institutions such as University of Minnesota and University of Michigan boycotted the products of Coca Cola from their campuses blaming the company for unethical business practises in India and Columbia. These universities stood in solidarity with the people of Plachimada in their struggle against the company. The networking of movement was so successful that, not only within India, but in distant places like North America too there were a series of movements organised against the company for over-exploitation of water and for leaving the people of Plachimada in distress. This Sassen terms as 'micro-environment with global span', where technical connectivity enables movements like Plachimada to network with similar groups in other countries (Sassen 2004: 655). Sassen argues that such connectivity would create a community of practice that creates solidarity at various levels, while simultaneously enabling local political or non-political actors to enter cross-border politics (Sassen 2004).

Plachimada was a localised struggle, but it engaged a global corporate giant – Coca Cola. It proved, as scholars argue, that local struggles and initiatives could become part of a global network without losing focus on the local issues (Cleaver 1998; Espinoza 1999; Mele 1999; Sassen 2004). In the words of Held,

> In contrast to earlier periods in which states and theocracies were central to cultural globalisation, the current era is one in which corporations are the central producers and distributors of cultural products. Corporations have replaced states and theocracies as the key producers and distributors of cultural products. Private international institutions are not new but their mass impact is. News agencies and publishing houses in previous eras had a much more limited reach than the consumer goods and cultural output of the global corporations today (2005: 318).

Globalisation as a process works at two levels – first, as dominant processes initiated as a part of integration of nation-state economies, second, as the oppositional politics and struggles that have emerged all over the world in response to the first set of processes. The first kind of globalisation along with new information and communication technologies (ICT) had given rise to new forms of political actors that are distinct from the nation-states and transnational corporations. The contending forces, like the Plachimada struggle, use the new forms of ICT in a globalised world to build solidarities in promoting their issues. Local struggles make use of virtual spaces created by new ICT in promoting their cause, and, thus, giving rise to new varieties of 'global politics' (Sassen 2004).

The Plachimada struggle also brings out the asymmetrical globalisation that is taking place. In this form of globalisation, everything – food, sex, health, life – is commodified and the logic of market dominates, where anything can be dislocated from its particular context (Pathak 2006; 88-89). The location of a Coca Cola plant in a poor village like Plachimada highlights this point – where groundwater was commodified and dislocated from its specific context. The struggle further brings out the debate between basic necessities versus market consumption – groundwater versus Coca Cola.

The intellectual class in the Plachimada struggle came from all over Kerala, and formed an umbrella organisation, as mentioned earlier, called the Plachimada Struggle Solidarity Committee (PSSC). The PSSC consists of activists, scientists, intellectuals, academicians and many others interested in the movement. The PSSC depended on the Plachimada struggle and the struggle was never dependent on the PSSC. The PSSC, true to its name, only gave solidarity to the movement, and provided unconditional support from outside. Never did the leadership of the movement slip from the hands of the local people. However, the presence of charismatic personalities like Medha Patker and Vandana Shiva[1] gave the movement significant media attention.

For many people who remain distressed due to the ongoing process of globalisation, Plachimada is a symbol of hope. People look at the struggle of Plachimada not only as an environment movement but also as an indigenous struggle that has the underpinnings of anti-globalisation. Plachimada renewed the debate on globalisation with vigour. Garnering support from all major political parties, academics, and social and environmental activists, the Plachimada struggle reiterates the need for globalisation with a human face. It also brought out the strength of grassroots people's movements against any kind of injustice. Further, the movement helped in reiterating the importance of community rights over resources like water and land, along with the right to good environment. In many parts of the world today, Plachimada stands as a symbol of the fight against the *cocacolisation* of indigenous societies. Hence, movements against Coca Cola in Madhya Pradesh, Rajasthan and Tamil Nadu have been deeply inspired and influenced by the Plachimada struggle. As long as indigenous and healthy drinks such as tender coconut, water melon, *lassi* (sweetened butter milk), and *nimbupani* (lemon water with salt) exist all over the country, there will be resistance to MNCs like Coca Cola, and the Plachimada struggle is just one grassroots initiative in that direction.

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[1] I noticed newspaper cuttings of visits by Medha Patker and Vandana Shiva to the Plachimada struggle site posted in the small hut that the protestors had erected in front of the Coca Cola plant.

5. Conclusion

One of the crucial underlying factors in this movement was the loss of livelihood. The modern legal system fails to recognise customary rights of communities over natural resources such as groundwater. In that sense, movements like the Plachimada struggle strive to establish traditional rights of communities over land that goes beyond the formal legal framework, and thus, beyond the logics of the state. Natural resources were traditionally managed by the communities at the local levels (Iyer 2003: 123). Iyer, argues that the advent of the British empire– 'modernity' – changed the control of natural resources from the communities to the hands of the state. In other words, the state claimed the ownership of the resources, and management passed on to specialised agencies comprising of engineers and bureaucrats (*ibid)*. This process of change in ownership and management of resources alienated communities from their local resources, which in turn put pressure on their livelihoods. The Indian state too continued with the same framework of the colonial state by claiming right over all the natural resources within the country. The state looks at natural resources as something to be exploited and used for growth/development.

The PCCVSS mobilised the people of Plachimada and nearby villages by invoking the adverse impact of the Coca Cola Company on groundwater and on the livelihoods of the people. The movement argued that the community has the right to groundwater as opposed to the state and the Coca Cola Company (market). Water being essential for drinking and for agricultural purposes (and since the same was threatened by the company), people mobilised against the company by claiming their entitlement to groundwater.

The people of Plachimada through their struggle against Coca Cola asserted their traditional community rights over groundwater. The fact that this right was unrecognised explicitly under the legal framework did not prevent the people of Plachimada from struggling and asserting their rights. It also highlights the conflicts between different sets of rights within the constitution -- fundamental rights and legal rights. Groundwater being essential to sustain life and livelihoods could be argued as

belonging under fundamental rights, while the company tried asserting its right to water following its ownership of land.

Thus, communities like the ones in Plachimada perceive natural resources as 'Mother Nature' since their livelihoods are intricately intertwined with natural processes. Thus, for communities in India 'nature' is a socio-cultural-cum-livelihoods space, whereas the state looks at such spaces as a source of resources that are to be exploited. Hence, the state's claims over natural resources continue to be in conflict with those of the local communities resulting in the latter asserting their traditional right through struggles. Thus, the Plachimada struggle is to be seen in the context of communities asserting their traditional rights over resources that goes beyond the logics of the state.

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Unequal power, unequal contracts and unexplained conflicts: facilitating negotiations over water conflicts in peri-urban catchments

S. Janakarajan

1. Introduction

Rapid industrial growth and fast urban expansion pose serious problems in many cities and peri-urban areas across the world. Without doubt, these problems are most pronounced in developing countries, especially when industrial development and urban expansion are unplanned and unregulated. When little account is taken of interactions between urban and peri-urban areas, as is often the case, the main casualties of haphazard developmental activities are to be found in the peri-urban areas[1]. As urban areas spread, they engulf and/or exploit the natural resources of an increasingly large peri-urban area. Many other factors contribute to the marginalisation of people and communities in the peri-urban areas as well. These include: unstable employment patterns, insecure agriculture, increasing rural – urban migration, increasing numbers of people with no fixed abode, and the emergence of cultural practices that undermine or conflict with traditional practices. Thus, the status of peri-urban areas is eventually reduced to the one of a `*neither here nor there*' situation, in which they lose their traditional characteristics of being predominantly agrarian economies, and at the same time do not have the benefits of being an integral part of an urban economy. In other words, people in the peri-

[1] The expression peri-urban is used quite frequently in recent literature; however, there is little conceptual clarity in the usage and definitions are restrictive and location specific. The Organisation for Economic Co-operation and Development (OECD) in its report on peri-urban agriculture (OECD, 1979: 10) states: *The term "peri-urban area", cannot be easily defined or delimited through unambiguous criteria. It is a name given to the grey area which is neither entirely urban nor purely rural in the traditional sense; it is at most the partly urbanised rural area. Whatever definition may be given to it, it cannot eliminate some degree of arbitrariness.*" Multiple meanings of the term peri-urban include: fringe; edge city; urban spread; less important part; incidental to main activities; outer edge; fringe to the main; spillover, peripheral to or adjoining main area *etc*.

urban areas lose their traditional identity and livelihood options, and get none of the *assured benefits* an average city dweller might expect (*e.g.* urban employment, urban infrastructure).

Growing urban sprawl and the subsuming of peri-urban areas into mega cities can be likened to a snake catching a frog! A snake catches a frog; the latter screams initially but the sound gets reduced gradually, and finally it will not be heard at all. And, this snake is a hidden friend! This particular process does not have a specific time frame – it is a process which is determined by many socio-economic, political and environmental factors. In this process, some people in the peri-urban areas benefit, but a majority suffer in one way or the other. Therefore, the key issue at hand is not the growth of large cities, but the unplanned and unregulated spread of cities, and the increasing demands put on peri-urban areas for water and other resources bringing about unacceptable societal and environment consequences.

The process of urban expansion is almost inevitable and unstoppable. If the process is not planned and regulated, conflicts are inevitable. Water, hitherto claimed only by the agricultural sector, is used more and more for non-agricultural urban uses and/or it is conveyed by various means from peri-urban to urban areas. As a result, competition for water and the risks of over-exploitation increase in the peri-urban areas. Pollution and degradation of natural resources such as land and water takes place as a result of increasing urbanisation and industrialisation in peri-urban areas. Agricultural employment declines causing serious livelihood problems for the people living in peri-urban areas. Women, who have lost agricultural employment, are often the worst hit. Village commons, both land and water bodies, are either encroached upon or fall into disuse. In the transition stage, peri-urban areas often suffer from an institutional "vacuum" which leads to inadequate provision of services (such as schools and clinics) and infrastructure (such as sewage systems, water supply networks, and roads), and to dramatic changes in land use patterns, and relocation of industries to peri-urban areas. All these factors can contribute to increased conflicts.

Although the majority or people living in peri-urban areas suffer from the consequences or urban expansion, there are certain social groups, who often gain distinct benefits. For

instance, due to a hike in land values (in those plots which are favourably located) a few land owners get a huge jump in their asset value. But, a majority may lose even the existing value of their lands due to lack of water. Similarly, some farmers can make large profits by abandoning agriculture, and by selling water for urban use. But, this can affect groundwater availability in nearby agricultural wells. Depletion of groundwater, or fast declining groundwater tables, can affect the livelihoods of a majority of people in the village population. Very often riverbed aquifers are exhausted by installing bores along the riverbed which reduces water availability (both surface and groundwater) for agricultural uses in the adjoining villages, and village commons are encroached upon reducing access to poor people in the villages. Therefore, in each one of these developments, the majority loses, and a few gain significantly. Most importantly, urban users exploit the natural resources to their best advantage, and transfer the pollution to peri-urban areas from where the natural resources were exploited. Or, put another way, urban demand for fresh water is met from rural areas. But urban wastes (by way of sewerage, industrial effluent, urban solid waste, hospital waste, industrial sludge *etc.*) are dumped back into peri-urban areas.

This paper was prepared during the inception phase of the Negotiating peri-urban water conflicts (NEGOWAT) project. NEGOWAT is a multi-partner research project financed by the European Union, DFID (United Kingdom) and ASPA (Brazil). In Chennai (India), Sao Paulo (Brazil) and Cochabamba (Bolivia) the project is focused on developing tools to better understand water-related competition and conflicts, and to help facilitate negotiations between stakeholders in these areas. More information on the project can be found at http://www.negowat.org

2. NEGOWAT project

NEGOWAT's core argument

Urban areas, almost always, rely on peri-urban areas as a source of water and other natural resources. Demands do not necessarily lead to conflict when cities are small, when they have a low demand for resources, or if the peri-urban areas are well

endowed with unutilised resources. However, if these conditions do not apply or if there is an absence of effective planning and regulation, conflicts are commonplace.

NEGOWAT's main objectives

Objectives of NEGOWAT:

- The project aims to document and analyse the impacts of unregulated and unchecked horizontal urban expansion on: 1) natural resources, and, in particular, on water resources, and, on, 2) poverty and livelihoods, ecology, environment, and the health conditions of people living in peri-urban areas.

- This project aims to develop and test tools and institutional structures that support and enable effective stakeholder-led water resources management that involves negotiations on emerging conflicts and water rights. It aims to draw upon developments in Integrated Water Resources Management (IWRM), and decision support methodologies that can be readily understood and adapted to support multi-stakeholder dialogues.

Proposed methodology and tools of analysis

The methodology of the study includes the following components:

- A comprehensive literature survey on: 1) issues relating to peri-urban areas; 2) competition between rural, peri-urban and urban areas for the use of natural resources; and, 3) stakeholder participation and stakeholder platforms as a policy option for achieving sustainable use of natural resources.

- A meso-level survey in various parts of the peri-urban area of Chennai (covering as many villages as possible), and a detailed survey in a small sub-set from among these villages with a view to collecting information on various relevant aspects such as: poverty and livelihoods; current and past water use patterns; the nature, extent and history of rural-urban water markets; impacts of sale of

water on agriculture, employment and income-generating opportunities; and ecology and environment.

- A water resource assessment of the Chennai municipal and metropolitan areas and the two adjacent districts of Kancheepuram and Tiruvallur. The aim being to develop a common water-related information base that can be used by relevant stakeholder platforms.

- Development of agent-based Bayesian models or Bayesian networks[2]. The aim being to produce practical decision-support tools that can be used when assessing the potential benefits of different water management strategies.

- Development of stakeholder platforms and user groups for a sustained dialogue that is part of stakeholder-led IWRM[3].

3. The NEGOWAT study area

Introduction to the Palar basin

The Palar River Basin covers an area of about 18,300 sq.km, of which, approximately 11,000 sq.km lies within Tamil Nadu. Average annual rainfall ranges between 800 mm and 1200 mm with a West-East gradient of increasing rainfall (Anon 2002). Most of the rainfall is linked to the southwest and northeast monsoons. The climate is tropical and highly humid, particularly

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[2] A Bayesian network is basically a graphical tool that can be used to build a decision support system, i.e., to help decisions under certain conditions. It helps to conceptualise a basin or an environmental system to be managed. "In an uncertain world, Bayesian networks allow users to estimate the chance that a management intervention will have a particular effect and then investigate the consequence of their uncertainty" (P.7 for details, Cain, Jeremy, 2001)

[3] Although IWRM has been widely accepted as an effective way to manage water resources, there is, however, less agreement about its implementability in developing countries because of lack of enabling environment. It is possible however to make use of the merit of the IWRM tool with the appropriate participation of all stakeholders in a river basin. But in this case, the application of IWRM will be through bottom-up approach rather than through the conventional top - down method. Nonetheless, it would be a big challenge to bring together various stakeholders, who have diverse and competing interests into a common negotiating platform. One of the motivations of the present project is to create space for such stakeholder-led IWRM in the context of peri-urban areas of Chennai, in particular the Palar basin.

near to the coast. Evaporation rates from open water are as high as 2000 mm per year which is much higher than the average annual rainfall. Flash floods are common only during the northeast monsoon months. A water balance study undertaken by the Institute of Water studies, Government of Tamil Nadu, indicated that even in 1992 the Palar Basin was a water deficit area (Anon 1992). Major irrigated crops in the basin are paddy, sugarcane, groundnut, and, to some extent, banana. Major unirrigated crops are coarse cereals and groundnut.

Tanks have historically been the most important sources of irrigation water in the basin (Janakarajan 1993). There are no major storage reservoirs, but one finds a series of seven anicuts (diversion weirs), which fill a large number of irrigation tanks. The total number of tanks filled by these anicuts is little less than 700, and the total area irrigated by these tanks is about 61,000 hectares. These are called system tanks. Besides system tanks, a large number of non-system tanks also exist in the basin.

In addition to tanks, there were numerous springs, which were used historically as a source of irrigation. According to the Institute of Water studies, there are about 606 spring channels in the basin area (Anon 2000). However, as tanks and springs are becoming less and less dependable, wells have emerged as the major source of irrigation water. Indeed, the introduction of high yielding varieties in this region in the mid-1960s prompted farmers to invest in groundwater irrigation quite extensively. This trend peaked in the 1970s (Farmer 1977; Janakarajan 1986). The situation in 1998 was that the net irrigated area by wells in the basin was around 75% of the irrigated area. A study carried out by the Institute of Water Studies indicated that in the late 1980s there were around 132,000 irrigation wells in the basin area, and the density of wells varied from 0.74 to 2.82 per hectare. By 2003, groundwater utilisation was believed to be as high as 92% of sustainable yield.

Apart from meeting the demand for irrigation, groundwater has also been a major source of water for domestic, industrial, and other non-agricultural uses. Quality, however, varies a great deal across the basin. To date, the issue of water quality has not been addressed fully during the assessment of groundwater potential across the river basin. As will be discussed later in this

paper, the tanning industry is a major source of groundwater contamination.

Urbanisation in the Palar basin

Although the agricultural sector is still the single largest user of groundwater, there have been growing demands for this resource from other sectors or users. Urbanisation, increasing demographic pressure, and expansion of industrial activity have all contributed to a situation of high-levels of competition for groundwater[4]. Competition is particularly acute because almost all the available surface water sources have been utilised. As competing claims on the limited groundwater stock have increased over time, conflicts or conflicting interests have also emerged among various user groups. The word `conflict' in our present context need not be understood as referring to physical violence. It should be rather seen as a potential force for competition and change. This competition could lead to stagnation or advancement of an economy depending upon degrees of cooperation among stakeholders.

In the particular context of groundwater resources, conflicts take place due to scarcity that is in turn caused due to imbalances between supply and demand of good quality water. One can attribute two reasons for this: 1) excessive unregulated pumping resulting in lowering of water tables, and, 2) groundwater pollution caused by the discharge of industrial effluent, use of chemical inputs in agriculture, and discharge of untreated domestic and municipal sewage.

The primary non-agricultural users are urban industrial owners and municipalities. Whatever quantity of water that is consumed for domestic needs and industrial processing is discharged as sewage and effluent into water courses such as lakes and tanks. This contributes significantly to the pollution of surface and groundwater bodies. Therefore, the transportation of potable groundwater from peri-urban to urban areas not only aggravates the problem of falling groundwater levels, it also

[4] The transformation processes in Latin American countries have contributed to a similar competing demand for water resulting in growing contamination and vulnerability of human settlements in marginalised areas (Moreyra 2001).

contributes to the generation of effluents that contaminate water courses and aquifers. The net result is increased water scarcity, increased health hazards, decline in soil quality, reduction in agricultural yields, rise in the cost of living, and, as a general consequence, an increased likelihood of conditions of persistent poverty[5].

Impacts of the tanning industry on water quality in the Palar basin

India's export earnings from the leather industry shot up from a mere Rs. 0.32 billion in 1965 to Rs. 100 billion in 2001. This industry provides direct employment to over 2 million people in the country. Fifty one percent of leather exports originate from the southern states and 70% of the tanning industries are concentrated in this region. Tamil Nadu is responsible for 90% of the total exports from the southern states, the value of which is Rs.50 billion. And finally, 75% of the tanning industries in Tamil Nadu are concentrated in the Palar basin.

While these facts about the leather industry may appear quite heartening, the current environmental impacts of the industry are frightening. Let me give some details on the impact of tannery pollution on the local economy, agriculture and people[6].

- On an average, 35 to 45 liters of wastewater are discharged per kilogram of raw skin /hide that is processed. Total quantity of water used by the tanneries in the basin works out to a minimum of 45 to 50 million liters per day. The quantity of effluent discharged from the tanneries (numbering 847), works out to 37,458 kld or 13.5 mcum per year. Note that, in theory, these tanneries are supposed to be connected to one of the 8 Common Effluent Treatment Plants (CETPs) installed in the Palar basin.

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[5] Similar cases have been observed in the Latin American countries (Moreyra 2001).

[6] Most of the information provided in this section has been collected through a survey carried out during the years 1997-99 in 51 villages of the Palar basin. This was a part of the research funded by International Development Research Center, Canada.

- For each 100 kgs of raw hide and skin that is processed, solid waste generation works out to be 38.5 to 62 kgs.

- According to a study carried out by Stanley Associates sponsored by the Asian Development Bank, and executed by the Tamil Nadu Pollution Control Board, pollution loads in the Palar river are extremely threatening: (all parameters are in kilograms per day) TSS: 29,938, TDS:400,302; Chloride: 101,434, Sulphide: 3818; BOD: 23,496; COD: 70,990: Total Chromium: 474; Cyanide: 22.

- Drinking water is sold at Rs.2 per pot in Ambur (one of the worst affected towns in the basin). In 1997, eight deaths were attributed to consumption of polluted water in this town (The Indian Express 8-4-1997).

- A detailed survey of eight villages conducted as a part of a IDRC research programme indicated that the value of land had come down drastically due to degradation of groundwater and soil salinity.

- There has been a steep reduction in the area under paddy in the affected villages. Since 1980, area under paddy has come down by more than 50% as a result of poor germination, stunted vegetative growth, poor grain formation, reduced grain weight and low quality output.

- Net area irrigated by wells in the affected villages is extremely low compared to those of unaffected villages.

- More than 60% of the wells in the affected villages are defunct due to water contamination.

- Of the 51 sample villages (located along the river) that were selected for the survey, 42 were very badly affected, three were moderately affected, three were marginally affected and two were unaffected.

- There has been forced migration of people from many villages in the study area.

Summary of issues and concerns in the Palar basin

To sum up the information presented above, the extreme water stress in the upper Palar catchment is characterised by issues that include:

- Decline in the utility and reliability of traditional irrigation sources such as tanks and springs.
- Competing demand for groundwater among agricultural, industrial and domestic sectors.
- Groundwater tables that are falling progressively.
- Declining agricultural activity and employment.
- Flourishing rural-urban water trade.
- Contamination and drying up of the river-bed aquifer which was the most important source of drinking and irrigation for hundreds of villages and towns in this basin.
- Emergence of markets for drinking water in the urban, semi-urban and rural areas.
- Declining groundwater quality and increasing number of abandoned wells, and a consequent increase in indebtedness among farmers.
- Declining life expectancy of tannery workers as well as people in the basin area.
- Fear of impotency due to the consumption of contaminated water.

Societal reactions to water problems in the Palar basin

This situation in the Palar basin is extremely serious and, arguably, at a crisis point. Such a volatile situation could have been contained had there been some thoughtful and timely policy measures. But unfortunately, all hitherto policy measures have failed to address the important issues of conflicts over

the use of water, competing demands over it, the relationship between overuse of groundwater and pollution on the one hand and rural-urban migration, deteriorating health due to water contamination and poverty on the other.

An example of societal reaction to one aspect of the water situation is provided by the following case. The Vellore Citizens Welfare Forum filed a PIL (Public Interest Litigation) against the tanners in 1991 before the Supreme Court of India under Article 32 of the Constitution. The Supreme Court Bench in their judgment clearly upheld the Precautionary Principle and the Polluter pays Principle as the most fundamental and essential features of sustainable development. An excerpt from what is regarded as a far-reaching judgment delivered by the Supreme Court Bench, constituting, Justices Kuldip Singh, Faizan Uddin and K. Venkataswami states:

> "It is no doubt correct that the leather industry in India has become a major foreign exchange earner and at present Tamil Nadu is the leading exporter of finished leather accounting for approximately 80% of the country's export. Though the leather industry is of vital importance to the country as it generates foreign exchange and provides employment avenues, it has no right to destroy the ecology, degrade environment and pose as a health-hazard. It cannot be permitted to expand or even to continue with the present production unless it tackles by itself the problem of pollution created by the said industry".

In response to the Supreme Court's direction that polluters should pay for the restoration of the ecology and compensation for the victims, about four-fifths of the tanners said that the Government and society should bear most of the burden. Many of them asked why the tanners alone should be penalised for the past environmental degradation (Madras School of Economics 1998). They even went to the extent of asserting that the notification of the Government of India conferring power to Loss of Ecology Authority is *ultra vires* of the Environment (Protection) Act 1996 and the provision of the Constitution. They also added that the Authority has no jurisdiction to assess or demand compensation in law,

and, that the Authority by claiming compensation is violating principles of natural justice.

Notwithstanding the above, the popular view is that the polluters should pay for the damages. But what is the practical mechanism with which one can ensure that the industries internalise environmental costs? This is difficult particularly in a situation where there exists a nexus between bureaucrats and polluters. The Tamil Nadu Pollution Control Board (TNPCB) prescribes the norms; the Supreme Court orders for the closure of the units which do not comply with the norms prescribed by the TNPCB. But this is all that happens as orders are not enforced.

4. Rural – urban and peri-urban – urban water markets

Water markets and water transfers

Why is it increasingly important to take a serious view of rural – urban and peri-urban – urban water transfers and water markets? First, India is projected to be more than 50% urban by 2020. While the absolute number of people living in rural areas will continue to grow, urban populations will grow far faster. This will create huge demands on water resources. *Secondly*, as a result of the above, there will be increasing pressure to transfer water from agricultural to urban use. In driving this trend, urban dwellers are likely to be more educated, politically active and influential than their rural counterparts. As a result, political power in India is likely to shift even more heavily toward urban areas. While agricultural interests may resist pressure to transfer water, it may be very difficult to sustain such resistance (Moench and Janakarajan 2003).

Water markets and different systems of water transfer are becoming increasingly common in areas adjacent to both large urban areas and large towns. These transfers typically involve sale of water by well owners (generally farmers) either directly to industries or to tanker companies who then deliver supplies to end-users (smaller industries, commercial establishments and households) or to the Metro Water Board. This type of market has, in comparison to rural water markets, been less studied. The impact of transfers on agricultural users is probably the

most controversial point of debate with respect to these water markets (Janakarajan 1999).

The lower Palar basin: a case of problems in a peri-urban area

The lower Palar Basin is highly relevant to the NEGOWAT project because of its proximity to the Chennai city for reasons that include:

- Large volumes of groundwater are pumped from aquifers in the lower Palar basin, and are transferred to the Chennai metropolitan area. Although the exact volumes are difficult to estimate, it is believed that the extraction is of the order of 40 mld (i.e. 14.6 Mcum/year).

- As they do not have their own transport, farmers selling water are compelled to enter into contracts with agents. Although these contracts have the potential of bringing short-term gain to individual farmers, they run the risk of depleting resources and thereby causing long-term problems for individual farmers, the agro-ecology of the village and future generations.

- The irony is that an individual seller often enters into a contract with a buyer knowing fully well that his bore-well will become dry sooner or later due to non-stop pumping. The reason for this action being that he prefers to sell water, even at the cost of his agriculture not just because his income from water sales is more than what he might get from agriculture, but mainly because, if he does not enter into a contract for selling his water, his neighbour would do so. In which case, the net result would be the same.

- Illegal sand mining from the riverbed is a major issue in this part of the basin. This activity reduces the storage capacity of the riverbed aquifer.

- Overexploitation of coastal aquifers has led to seawater intrusion up to a distance of over 10 km.

- Unsustainable rates of groundwater extraction and the resultant lowering of water tables has led to the drying up

of springs and seepage zones. This has had a detrimental impact on agricultural production and the environment.

- The past one decade has been quite dreadful for the people of this region because of overexploitation of water resources. The problem is particularly severe in the lower Palar basin as a result of the proximity of this part of the basin to the city. This part of the basin can be classified as being peri-urban and, as such, it attracts the attention of neither the local panchayats nor the city administration. There is in fact an *institutional vacuum*, and little or no action is being taken against illegal encroachments on wetlands or illegal sand mining.

- Agriculture as an occupation has been on the decline. This has led to a decrease in agricultural employment, particularly among women, and a simultaneous rise in rural-urban migration.

- Traditional water bodies such as irrigation tanks, spring channels, ponds *etc*. are either in a state of total neglect or have been encroached for urban use.

Water transport from other peri-urban areas close to Chennai

Large volumes of groundwater are pumped from agricultural wells and transported into the city every day from other peri-urban areas close to Chennai city. Particularly important are the Araniar and Kosathaliar river basins. The United Nations Development Programme (UNDP) and the Water Resource Organisation (Government of Tamil Nadu) estimated that the total water potential available in Araniar and Kosathaliar river basins is about 350 and 594 Mcum/year respectively. Currently over 37 Mcum/year of groundwater is drawn from these basins to supplement the drinking water needs of the city population. So in fact, the extraction of groundwater is a relatively small proportion of the potential yield. However, there is a big question mark over the sustainability of groundwater supplies. It was apparent from NEGOWAT field visits in these areas that many agricultural wells and many wells supplying water to Chennai, have become dry. Moreover, due to proximity to the sea, seawater intrusion has already reduced the quality of

groundwater in these areas. In several places, farmers and local people are agitated by round-the-clock pumping of groundwater from agricultural wells to meet urban needs. In fact, women's organisations in two villages in the Panjatty – Minjur area have successfully stopped the sale of water to the Metropolitan Water Board. Project staff were informed that the officials invoke an emotional argument while searching for water sellers: *that if you cannot supply water to your own people at Chennai, how can we ask water for our farmers from Karnataka*?[7]

5. Chennai drinking water supplies

A brief discussion on the current and persisting crisis

Although it is quite clear that many households in Chennai face major problems accessing sufficient domestic water, important questions on fundamental causes of the problems persist surrounding the existence of an absolute scarcity of water in Chennai, and the contributions made by the lack of integrated, long-term planning in creating the perceived water crisis in the city.

Over the period of last two to three decades, the Government of Tamil Nadu has spent over Rs. 30 billion in augmenting water supply to the city but still problems persist. Leaving aside the fact that poorer communities are facing the greatest hardships, average per capita water supply to Chennai's population is the lowest (76 lpcd) when compared to the major cities in India (Ruet *et. al* 2002). Chennai's water supply is also extremely unreliable and sporadic. Even during good rainfall years, water is supplied hardly for three hours per day.

The following is a brief analysis of recent water supply initiatives:

(i) *Chennai water supply augmentation project – I – New Veeranam project:*

The Tamil Nadu Government has been executing this project at

[7] There is a long-running inter-state dispute between Karnataka and Tamil Nadu surrounding the water of River Cauvery.

an estimated cost of Rs.720.00 Crores. The proposal is to draw 190 mld of raw water from the Veeranam tank in Cuddalore District situated about 230 km south of Chennai. After treatment, 180 mld should be available for Chennai city. Recent analysis of this scheme suggests that performance has been far below expectations.

(*ii) The second Chennai water supply project:*

The revised cost of the project is Rs. 778 crores with financing coming in part from a World Bank loan to the tune of US$ 86.50 million. The nature of the work executed in this project includes: construction of a pump house at Red Hills, installing Archimedean screw pumps at Koyambedu sewage treatment works, and making improvements to 16 sewage pumping stations.

(iii) Krishna water project:

The project envisaged bringing water from the Krishna River in Andhra Pradesh to the extent of 15 TMC feet (equivalent to 425 Mcum/year) of water at the cost of Rs. 600 crores. The Government of Tamil Nadu has already executed this project, but most of the water transferred to Tamil Nadu is being extracted by users en route.

(iv) Chennai city river conservation project:

Government of Tamil Nadu, jointly with Ministry of Environment and Forest (Government of India), undertook a comprehensive study of the causes of pollution of the waterways in Chennai, and its impact on the environment. The city has six waterways *viz*. Adyar, Cooum, Buckingham canal, Otteri Nullah, Captain Cotton Canal and Mambalam Drain. Essentially, these waterways perform the role of flood and sewage carriers. Flash floods occur in these waterways during heavy monsoon months. However, for most part of the year, the flow is maintained in these water ways entirely as a result of discharge of treated, partially treated, and untreated industrial effluent and domestic sewage. This discharge takes place from about 311 outfalls that are meant for storm water discharge, and, the result is an accumulation of large volumes of sludge particularly at the mouths of rivers. Hence, the long term objective of the project is to improve the

wastewater or sewage disposal network so as to prevent toxic substances from reaching the waterways. The entire project would be implemented by Chennai Metro Water Board at an estimated cost of Rs. 720 crores.

(v) Amount spent on transporting groundwater from rural and peri-urban areas:

Besides all the major projects mentioned above, the state government has been spending huge amounts of money in pumping and transporting groundwater from distant rural and peri-urban areas. Although these projects are planned to solve a short-term crisis, they involve a substantial amount of recurrent and capital costs. It is estimated that on an average, the Metro Water Board is spending about Rs. 10 million on purchasing water from farmers and transportation[8]. Furthermore, there now seems to be no end to the crisis[9].

(vi) Gedilam –Paravanaru aquifers

The latest initiative is to tap water from Gedilam riverbed aquifer near Cuddalore. The plan is to extract water from 45 deep bore wells being sunk near the Gedilam–Paravanaru riverbeds at an estimated expenditure of Rs. 49 crores, and to convey the water through 200 kilometers of newly laid pipelines. This scheme warrants infrastructure including high power motor, transformer installations, and other electrical appliances. This would hike the original estimated costs quite steeply. The authorities expect the total capital cost to cross Rs. 100 crores. According to the TNEB, each bore well is going to be connected with an 85 HP motor that requires a 100 kVa capacity transformer. It was stated that once the system becomes operational, water will be pumped nonstop from 45 bore wells with a view to ensuring uninterrupted water

8 The Hindu, dated 13th March 2004

9

	Nov 2003	Jan 2004	Mar 2004	May 2004
No of tanker lorries hired	595	726	1100	1300
No. of daily trips	6733	7555	9500	12000
No of tanks installed	10030	10430	11315	13500
No of pumps installed	5500	6500	7000	7500
Daily expenditure (in million Rs)	5.5	7	8.5	10

Source: The Hindu, dated 13th March 2004

supply of 90 mld (i.e. 33 Mcum/year). The proposed depth of each bore well is about 200 meters. The recurrent cost of running these motors – by way of electrical consumption alone will be nearly Rs 70 lakhs per month. There is, however, another dimension to this project. The Gedilam aquifer is the lifeline for the people of this region in terms of providing farmers with irrigation water and domestic water demand of villages. If this aquifer is exhausted agriculture will be very badly hit, and, the reliability of drinking water supplies may deteriorate (The Hindu April 7th, 2004).

6. Applicability of IWRM to Chennai and the Palar basin

Integrated Water Resources Management (IWRM)

It is clear that the Chennai metropolitan area, and the surrounding peri-urban areas continue to face severe water supply problems. This is despite the huge amounts of money already spent by the Government of Tamil Nadu. The obvious question is whether, effective, long-term solutions to the water problems faced by Chennai and its surrounding peri-urban areas are possible. A widely-held view is that solutions to water crisis are only feasible if there is a shift towards an integrated approach to water management, and, probably more importantly, an integrated approach to water governance. Such an improved approach to water governance would need broad-based partnerships and dialogues among all key stakeholders, leading to strategic planning based on a common vision, scenario-building, and good-quality information.

National and state-level policies concerning water use, protection and conservation

In India, there are national water policies that have been drafted at the highest possible level of the government, but they are no more than a statement of intentions as these policies are not supported by legislation or time-bound action plans. Therefore, the policies made at the highest level as prescribed by IWRM have very little operational impact due to lack of institutional mechanisms to plan, coordinate and implement water development across state

boundaries and among users. This is a clear case of a fractured institutional structure.

Appropriate water laws

Are there no laws to take care of the provisions of IWRM in India? The 42nd Amendment of the Indian Constitution passed in 1974 was a landmark. This enabled a series of water and environmental protection laws to be enacted, the most important of which is *The Water (prevention and control of pollution) Act*. Subsequently many state governments have passed their own laws in order to:

- Arrest seawater intrusion;
- Regulate groundwater use by way of imposing a space constraint between wells;
- Banning groundwater pumping from all surface water courses such as streams, rivers, canals *etc*.;
- Prevent illegal sand mining from riverbeds;
- Prevent pollution of surface and groundwater bodies;
- Protect all water bodies from encroachments;
- Achieve equity between head and tail enders within an irrigation command;
- Protect the water rights of farmers.

But one still encounters problems such as huge groundwater overdraft, appalling pollution, competition between various sectors, rural versus peri-urban conflicts, neglected state of traditional water bodies such as tanks and springs, widespread sand mining, and seawater intrusion. Therefore, there are laws but unfortunately what India lacks are enforcement and monitoring mechanisms. This is indeed the reason for the disquieting levels of pollution in the basin of the Palar River.

Creating a conducive institutional framework for IWRM

Creating a conducive institutional framework for IWRM in and around Chennai is a tough challenge. The Water Resources Organisation (WRO), which is supposed to be the parent organisation for all water-related activities in Tamil Nadu, operates independently from other government agencies with an interest in water. For instance, there is virtually no coordination between the Metro Water Board, WRO, Pollution Control Board, Groundwater Board, Department of Agricultural Engineering, and Department of Agriculture. Each one of these agencies formulate their own policies and action plans. A good example of this lack of coordination was the construction of a dam across a polluted river at Orathapalayam in Tiruppur. As a result of lack of integrated planning, this dam, which was meant to collect good quality water, effectively captures all the effluent from Tiruppur town.

The revenue department is considered to be a rival organisation by the WRO, as it enjoys more powers compared to other departments. For instance, unlike the revenue department, WRO cannot take any punitive action against defaulters on an irrigation system. At best it can lodge a police complaint or make a report to the revenue department. Similarly, the WRO can do nothing about the polluters of water bodies which are under its control. The Agricultural Engineering Department, which works on issues relating to installing community wells, water logging, sanitation, land reclamation, creating recharge structures, watersheds, on farm development work *etc*., is detached from WRO and other agencies.

Finally, and most importantly, state agencies such as the Groundwater Board, the TWAD Board, and the Metro Water Department which are directly involved in water use and management, do not share information nor do they collaborate actively with the WRO or other agencies. The existing institutional structure is such that it neither pays attentions to creating a conducive organisational framework for IWRM, nor does it develop appropriate human resources for coordinated activities.

Appropriate management strategies

The fractured institutional structure, myopic policies coupled with competitive populism and lack of political will, stand in the way of attempts to promote or adopt any of the management instruments prescribed by IWRM. Demand management and associated regulatory instruments, if used incorrectly, have the potential to have disastrous consequences in a country like India where one third of the population lives below the poverty line.

The existing institutional structure in Tamil Nadu does not provide the required enabling environment for adoption of strategies prescribed by IWRM. Nevertheless, the emerging water crisis leaves no option but to work hard towards improved long-term management that includes many of the elements of IWRM. But, how to adopt IWRM, in a situation where everything is misplaced? Clearly, multi-stakeholder dialogue (MSD) hold much promise. Let us discuss this issue in the next section.

7. Approaching IWRM through Multi-Stakeholder Dialogue

The experience of the Palar basin

In an atmosphere of intense competition and bitter conflicts, the key questions revolve around the best possible mechanisms and agents that can bring together the stakeholders for dialogue and coordinated action. The real usefulness of MSD lies in the fact that it can provide a platform for all stakeholders to express and discuss their views and concerns. As such, it provides an enabling environment for better understanding and analysis of existing situation and past and future trends. MSD also provides a means by which stakeholders are able to appreciate each other's problems while keeping in mind the welfare of the society at large. In theory at least, MSD should help the authorities to have a better understanding of grassroots realities, and to make improved management and investment decisions. IWRM clearly cannot be imposed from above, especially, in an atmosphere, in which, law enforcement and monitoring mechanisms are weak. It has to be bottom-up, and has to be induced by stakeholders. To date, government institutions have not been successful in resolving critical water management challenges faced by the

Chennai metropolitan area and its surrounding peri-urban region. Therefore, it is in the best interest of the government to try and facilitate such direct negotiations, and become a welcome arbiter instead of being considered as the incapable bully who wants to decide everything without taking into consideration the local realities (Chert 2000: p. 20).

As discussed earlier in this paper, almost all water-related initiatives have failed in the Palar River basin, including interventions from the highest judicial authority of the country. It was precisely this state of affairs in which MSD was attempted in the upper Palar basin. The experience of facilitating MSD process in the upper Palar basin are described below.

Multi-stakeholders' meeting – experiences in the upper Palar basin

The first step was to organise a meeting of stakeholders with participants drawn mostly from the Palar river basin. Preparatory research and the initial stakeholder analysis carried out in the basin were found useful for organising the first stakeholder meeting. However, involving tannery owners (the main polluters) in the meeting was found to be very difficult. Tanners initially even refused to meet with project staff, and it took a couple months before their confidence was won over. They only agreed to participate in meetings after repeated visits, and after being given the assurance that the closure of the industry was not regarded as a solution. There were 12 participants from the tannery sector, and all of them participated in the dialogue for two full days.

Even greater difficulties were encountered in involving government officials, particularly from the Tamil Nadu Pollution Control Board (TNPCB). Many officials called it a `sensitive matter', and expressed fear in participating in the proposed MSD. Altogether, there were five officials from the Government, which included one from the TNPCB. All of them stayed for not more than half a day.

Other participants at the first MSD meeting were farmers' representatives, NGOs, local doctors, residents of local towns, microbiologists, lawyers, media persons, academics, and the interested general public. The `Multi-stakeholders Meeting of

Water Users of the Palar River Basin,' was held, during 28th and 29th January, 2002, at Chennai, with 120 participants[10]. Before beginning the dialogue on the first day, there were panelists' presentations on various aspects of water use with particular reference to the basin. These presentations prompted a good deal of heated arguments and lively discussion. The fact that the meeting gave an opportunity for all stakeholders to air their views was much appreciated by the participants to the extent that towards the end of the meeting there was a big sigh of collective relief. During the meeting, it was widely acknowledged that MSD is a process and not a one-off meeting. Therefore, there was a general agreement to constitute a Committee from among those who were present so that the dialogue process could be carried further. The result was the birth of the *Social Committee* with 24 members. This Committee since then has met six times, and has transacted a good deal of business. The stakeholders have understood their problems better, and they have proposed future courses of action for implementation. The stumbling block however is the lack of much needed support from the government. This is going to be the biggest challenge for the Committee, and, therefore, the success or failure of the Committee will depend upon the degree of involvement of the government[11].

8. Negotiating water conflicts in peri-urban Chennai, including the lower Palar basin

- Since urbanisation is an inevitable process, should we let the peri-urban areas suffer at the expense of urban areas?

Or

- Is there a way in which urbanisation can be planned and managed for the best use and advantage of people and the environment in urban, recently urbanised, and peri-urban areas?

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[10] This was a part of the research `Local Water Supply and Conservation Responses' funded by the International Development Research Center (IDRC), Canada.

[11] A similar stakeholder dialogue approach was attempted with a view to resolving the much vexed Cauvery water dispute between Karnataka and Tamil Nadu. Farmers' representatives of both states have been meeting since April, 2003, and have been quite successful in resolving their differences.

These questions arise in part because the problems of peri-urban areas have not been tackled correctly. For a long time, research was carried out independently on either rural or urban areas. But as discussed in this paper, urban/peri-urban interactions are becoming increasingly important. Urban and peri-urban areas need to be examined as part of a single biophysical system, and part of an integrated socioeconomic developmental process. A fragmented approach only brings about rural-urban and peri-urban – urban conflicts and results in poor strategic planning. A fragmented approach also contributes to the destruction of ecosystems and livelihood options in the rural and peri-urban areas. In other words, issues related to peri-urban areas have been mistakenly viewed in isolation from the overall processes of `change'.

The following important areas of interest arise in the context of the present argument:

- Horizontal urban expansion encroaches upon natural resources, in particular land and water, enjoyed hitherto by rural and peri-urban communities. As a consequence, severe competition and conflicts can develop between urban and peri-urban areas. While Municipal Corporations, Housing Boards and State Metropolitan water agencies collectively negotiate claims over land and water rights on behalf of urban areas, peri-urban areas are represented individually, and are often subject to threats. These kinds of negotiations are often one-sided because of unequal bargaining powers enjoyed by these agencies. This is precisely the context in which a collective – multi-stakeholders' dialogue approach and a participatory planning process would be useful for a better negotiated democratic settlement.

- Though urban interests are deeply committed to make the most of the available land and water resources of rural and peri-urban areas, hardly any of these state agencies pay attention to or analyse vulnerabilities and long-term implications of their development strategies.

- The majority of people living in peri-urban areas suffer negative consequences from the process of urbanisation whereas some people benefit significantly from the spillover

effects of urban development. Important related issues that need to be addressed include coping strategies being developed in response to negative impacts of urbanisation, and the sustainability of these strategies.

- The responses from civil society, farmers' organisations, trade unions, NGOs and the media to emerging peri-urban issues also need to be discussed and deliberated upon. The role and understanding of political parties also need to be taken into account.

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Contentions over the Mullaperiyar and implications for river basin management

Madhusoodhanan C.G., K.G. Sreeja, T.I. Eldho and P.K. Shetty

1. Introduction

The Mullaperiyar project is an interstate, inter-basin scheme which diverts water from the upper reaches of the west flowing Periyar River in Kerala into the eastern plains of Vaigai River Basin in Tamil Nadu for irrigation, after power generation. It is one of the earliest trans-basin projects in India. It was commissioned in 1895 by the British in the then Travancore State by an agreement signed in 1886. This agreement was ratified after independence by the successor states of Tamil Nadu and Kerala. The project is situated in the territory of Kerala but benefits Tamil Nadu. It has been the source of much contention right from its conception.

The simmering tension started taking the form of a full-blown conflict between the two neighbouring states after major leaks were detected in the Mullaperiyar dam following which the water level in the reservoir was brought down to 136 feet from 152 feet in 1979. Over the years, the two states have been involved in a tussle over the issue of raising the water level back to its original level, and related safety concerns. The States and the Central government, various scientific, sociopolitical and judicial institutions have shaped the conflict and the resolution process during this tumultuous period.

The Mullaperiyar issue also throws into relief the practical challenges of the nascent river basin level planning that is envisaged in the country for the sustainable management of water resources. A project like Mullaperiyar where two river basins have been interlinked through water diversion (thus, extending the boundaries of water utilisation), has led to conflicts. There is a need to arrive at an inclusive perspective in conceptualising river basins that can take into account these extended boundaries of hydrological basins.

2. Mullaperiyar interbasin transfer: the project details

The geographical area related to the Mullaperiyar (also called Periyar, Mullaiperiyar) Project comprises of the donor Periyar River basin in Kerala, and the recipient Vaigai River Basin in Tamil Nadu. The west flowing perennial river Periyar originates from the Sivagiri group of hills in the Western Ghats, and traverses through the districts of Idukki and Ernakulum in Kerala to join the Arabian Sea. The Mullaperiyar dam is located in the upper reaches of Periyar River just after its confluence with Mullayar tributary, at an elevation of about 850 m above the mean sea level, in the protected forested tracts of Periyar Tiger Reserve (PTR) in Kerala. The catchment area of the dam is 648 sq. kilometres with the annual average rainfall being about 2000 mm.

The project, completed in 1899, consists of a masonry dam constructed with lime and surki mortar, having a length of 1200 feet and a height of 155 feet from the river bed. The Mullaperiyar reservoir was conceived with a Full Reservoir Level (FRL) of 144 feet (Mackenzie 1899). In 1908, the FRL was raised from 144 feet to 152 feet which was later reduced to 150 feet in 1964, to 145 feet in 1978, and further to 136 feet in 1979 due to safety concerns. The reservoir of the Mullaperiyar dam (known as Thekkady/Periyar Lake) is a major wildlife tourist destination. The total drainage area of the Periyar river basin is 5398 sq.km, of which 114 sq. kilometres lies in Tamil Nadu (GoK 1974). The area belonging to Tamil Nadu in the Periyar basin is drained by the tributary Nirar, which is diverted to Tamil Nadu as a part of interstate Parambikulam-Aliyar Project (PAP) agreement.

The catchment area of Mullaperiyar Dam falls completely within the territory of Kerala. Hence, Tamil Nadu has no riparian rights as far as this tract is concerned. The Idukki and the Lower Periyar Hydel Projects, and the Periyar Valley Irrigation Project of Kerala are located downstream of the Mullaperiyar dam in the main Periyar River. There are numerous thickly populated human settlements in this downstream stretch including the metropolitan township of Kochi.

The Vaigai River originates from the eastern slopes of the Western Ghats in the Varshanad ranges beyond the eastern watershed boundary of the Periyar basin, flows through the arid

plains of southern Tamil Nadu, and empties into the Bay of Bengal near Palk Strait. The river en route had been widely abstracted through a network of numerous tanks which served as reservoirs for irrigation. These tanks supplied by the river channels defined the terrain and character of the Vaigai plains before the Periyar Project had made many of these tanks redundant. The Vaigai basin has an area of 7030 sq.km. The basin lies in the rainshadow region of southern Tamil Nadu. The area receives an average annual rainfall of about 800 mm with its major share from the NE monsoons (Mohanakrishnan 1997).

The water from the Mullaperiyar Reservoir is diverted through an open canal and then through a tunnel to be collected at a forebay dam. From here water is taken through a power tunnel and penstock pipes to the Lower Camp Power House (4x35 MW) which generates 490 Million Units (MU) of electricity annually. During monsoon, surplus water (flood waters) from the Periyar reservoir is also discharged through this forebay directly to Cumbum Valley through Vairavan River for irrigation. After power generation, the tail waters are let into the Vairavan River in the plains which then joins River Suruliar (a tributary of River Vaigai). The water then finally gets collected at the Vaigai reservoir from where it gets released for irrigation.

The project was originally envisaged to benefit 36423 ha of the first paddy crop and 24282 ha of the second paddy crop. The entire command area had been localised in the erstwhile Madurai and Ramanathapuram districts (Mackenzie 1899). The irrigation command area of several existing rainfed minor irrigation tanks was also absorbed and served by the distribution system created under the project. The Periyar command area has since been extended in various stages, and through the modernisation of the Periyar Vaigai Irrigation Project. The water from River Periyar at present irrigates a gross ayacut area of 81,036 ha which includes the double cropped lands in the Cumbum valley in the Suruliar sub-basin in Teni district, single and double cropped lands in the Periyar main canal command area, the Thirumangalam main canal command, the Periyar extension area, and several additions that have been made over the years through modernisation projects in the districts of Dindigul, Madurai, Sivaganga and Ramanathapuram. Tamil Nadu diverts annually an average of 22.5 tmc feet (about 640 Mm^3) of water from the Mullaperiyar

reservoir kept at 136 feet level (Mohanakrishnan 1997). The water from the project is also used for meeting the domestic and industrial requirements in these districts especially of the Madhurai urban water supply demands.

Government of Kerala receives an annual lease rent of Rs.2.60 lakhs per annum for an area of 8692.97 acres leased out to Tamil Nadu. The royalty which Kerala receives from power generation comes to Rs.7.67 lakhs per annum (approx.0.16 paise per unit). The total share of benefits accrued to Kerala therefore comes to about Rs.10 lakhs per annum. Kerala also benefits by the lake created by the Periyar Reservoir which is a popular destination for wildlife tourism.

3. The ecological and political setting of the diversion and the conflict

Interbasin water transfer projects are very often born out of complex ecological, hydrological and political reasons (Gupta and van der Zaag 2008). The Mullaperiyar project lease deed was originally entered between British India and the Travancore princely state through a combination of political strong-arming along with the firm belief that the aridity of the Vaigai plains could be quickly remedied through the diversion of 'surplus waters' of the Periyar. The British Government held that the waters of the Periyar were "useless and likely to remain useless" to Travancore, and that the land being an uninhabited jungle, was of little value (Mackenzie 1899).

It was a time when the cycle of drought and rains in the Deccan plateau was exasperating the British, and grand hydraulic engineering solutions were being avidly sought to dispel the dread of drought through protective irrigation. The drive to balance the wet and the arid, thereby correcting the 'injustice of nature', was an enterprise that had captured the techno-hydrological imagination of Europe during the late 19th and early 20th centuries (Swyngedouw 2009). The traditional system of irrigation based on tanks that had studded the Tamil Nadu plains, and had provided for water security over the centuries won the grudging respect of the Corps of Royal Engineers. But according to the latter such a system was not up to the challenge of combating frequent droughts as far as their proud engineering

minds were concerned. This was evident in a discussion over the Periyar project in which Sir Richard Sankey (Chief Engineer and Secretary in the Public Works Department to the Madras Government between 1878 and 1883) observed,

> "In the central and southern portions of the peninsula dependence had from time immemorial been placed to a great extent upon rainfed tanks - a system of irrigation followed by the natives with wonderful success and energy. In the Madras Presidency there were about forty two thousand. Such a vast system, or anything comparable to it, did not exist in any other part of the world. Nearly all the rivers and tributaries were, almost from their sources to a certain point, stopped by a succession of earthen banks. The natives had carried out the whole system, but in times of continued drought, particularly when dry seasons followed each other, the country was left with little if any assistance from water, depending entirely upon the tanks, which, being rain-fed, often dried up and failed." (Barry *et al.* 1897)

The diverted water from Periyar River altered the Vaigai basin landscape significantly, especially after the construction of the Vaigai reservoir in 1959 with a storage capacity of 6800 Mcft for the extension of the irrigation command of the Periyar project. Independent India based its agricultural modernisation on large-scale river valley development schemes. The logic of diverting 'disused', therefore, 'surplus' waters of the monsoon blessed west-flowing rivers of the Western Ghats to be put to apparent beneficial use (by preventing famine related calamities in the thirsty rain-shadow plains) found a ready audience in such a context. Thus, even while many of the agreements entered into during colonial rule were nullified after independence, the two states of Kerala (successor to Travancore) and Madras (successor to Madras Presidency) informally agreed to maintain the status quo as regards the Periyar Lease Deed of 1886. The 1942 Umpires award had ruled that the Mullaperiyar water should be used only for irrigation purpose by the lessee. But without any formal agreement with Kerala state, Madras started hydropower generation using the Mullaperiyar waters in 1959 in a phased manner which was fully commissioned in 1965.

By then, the Periyar basin had become the 'dammer's dream land' (Nair, 1994) with its high potential for hydro-electric projects (HEPs) triggered by the peculiar topography and abundant rainfall, thus rapidly transforming the 'surplus waters' into a myth of bygone years. The rapid development of hydro-power and irrigation projects in the Periyar basin by Kerala was, therefore, viewed with rising suspicion by Tamil Nadu. The uproar on safety of Mullaperiyar dam by Kerala was construed from the very beginning by Tamil Nadu as Kerala's attempt at reclaiming its waters for its own use, especially after the Idukki reservoir in Kerala was commissioned in the year 1976. In fact, permission of the central ministry to Kerala for the Idukki HEP is believed to have been obtained only as a trade-off to endorse the Periyar lease deed with few amendments, ratifying the Periyar HEP with effect from 1954, and signing the PAP agreement with Tamil Nadu (Ravi *et al*. 2004).

Even though the safety of the Mullaperiyar dam had been raised as an issue before the Central Water and Power Commission (CWPC) (now Central Water Commission - CWC) by Kerala State in 1964, the Mullaperiyar issue was fully brought into the public domain when major leaks in the dam were reported by the Kerala press in 1979. The Machhu II dam failure in Gujarat in August 1979 further aggravated the feelings of insecurity in relation to the Mullaperiyar dam in Kerala. Consequent to this, CWC came up with emergency, medium-term and long-term measures for strengthening the Mullaperiyar Dam. One of the emergency measures was to lower the reservoir level to 136 feet. In 1986, CWC issued a 'Memorandum on Rehabilitation of Mullaperiyar Dam' which recommended the raising of the water level to 152 feet after completion of all the prescribed strengthening measures.

The completion of the strengthening measures by Tamil Nadu was delayed until the late 1990s by which time Kerala took a firm stand that the FRL of the reservoir should be maintained only at 136 feet even after carrying out the strengthening works as that would not impart the old structure its original strength. By then there were relentless and fierce public agitations in Tamil Nadu demanding the restoration of water level in the Mullaperiyar dam. During 1997-98, writ petitions regarding the Mullaperiyar issue were filed by Mullaperiyar Environmental

Protection Forum, Kerala, and Periyar-Vaigai Single Crop Cultivating Agriculturist Society before Kerala and Madras High Courts respectively, which were transferred to the Supreme Court of India (SC) following two transfer petitions to avoid the possibility of conflicting orders from the two High Courts. The SC delivered its final judgment on 27th February 2006 allowing Tamil Nadu to raise the water level of Mullaperiyar reservoir to 142 feet, and to carry out the remaining strengthening measures.

Following the judgment, the Kerala State Legislature amended the Kerala Irrigation and Water Conservation Act, 2003 in March 2006. The amended Act placed the Mullaperiyar dam in the schedule of 'Endangered Dams' and restricted its FRL at 136 feet. The case came back in the SC with renewed vengeance, and fresh complications with Tamil Nadu challenging the constitutionality of the amended Act of Kerala in its application to Mullaperiyar dam. (Madhusoodhanan and Sreeja 2010). Though the constitution of India confers original jurisdiction on the SC to adjudicate on any interstate dispute, the judicial process which is accustomed to applying a definite standard or rule may not be of much help in situations which are vague and fluid and where each case is a law unto itself.

Water has always played a major role in setting the political scene in Tamil Nadu. Any move that would compromise their water rights triggers intense political and social turmoil in the state. The state has witnessed widespread outbursts and political power games related to Cauvery and Mullaperiyar issues. All political factions in Tamil Nadu have taken up Mullaperiyar as a prime issue, and they have been influential in shaping public perception and the nature of conflict in Tamil Nadu. There are feeble chances of arriving at any solution to the conflict at the political level as political parties and key political actors in Tamil Nadu would not allow for any modifications to the historically enjoyed rights of the state.

In Kerala, the Mullaperiyar issue is influenced by the extreme sense of injustice that the state harbours against Tamil Nadu felt across all political parties, due to the interstate river water agreements of Mullaperiyar and PAP. Therefore an amendment to "The Kerala Irrigation and Water Conservation Act" in 2006 was promptly achieved with unanimous support

of the Assembly. The resentment against Tamil Nadu, and the public pressure to take cognisance of increasing water and power scarcity in the state has even gone to the extent of passing of a unanimous resolution in the Kerala Legislative Assembly against the proposed Pamba-Achancoil-Vaippar link as a part of the interlinking of rivers project.

In August 2007, the Kerala Cabinet also approved a proposal to start preliminary work on a new dam at Mullaperiyar to replace the older structure. Even though the present worry of the state of Kerala in the Mullaperiyar conflict is largely based on the safety of the old dam, there is a growing faction of belief that it is high time Kerala stood up for its rights over its own waters, rather than being constantly downtrodden by the influence of Tamil Nadu in the Centre due to coalition politics. The Mullaperiyar issue, thus, has become rife with political subterfuges and propaganda. Lack of mutual confidence, and disinclination of the state mechanisms to create an environment for an informed public discussion has led to frenzied public reaction on both sides of the border from time to time. Each fresh spurt of seismological disturbances or heavy rains in the catchment area heightens the panic, and triggers mass protests among the downstream population in Kerala. Widespread agitation continues to occur in Tamil Nadu demanding Kerala to abide by the SC ruling, and protesting the new dam proposal, taking the form of economic embargoes and traffic blockades of interstate movement between Tamil Nadu and Kerala on the National Highways, interstate arterial roads and feeder roads.

4. The apparent and implicit contentions over the Mullaperiyar project

Since the Periyar Project is an interstate river water diversion scheme which does not involve any water sharing between the states, the present conflict is apparently over the safety of the Mullaperiyar dam, and not over water allocation. The issue of rights over the resource and unequal sharing of benefits derived from the project have also now surfaced as the focus of conflict between the two states with the proposal for a new dam and the attendant demand for a new agreement. At a time when there is growing scarcity and crisis over water resources, the Mullaperiyar issue has every potential to turn into a conflict

over need for water sharing and allocation. For a long-term, sustainable solution of the Mullaperiyar conflict, it is, therefore, necessary to address these new emerging issues as well.

The maintenance of water level at Mullaperiyar

The water level at Mullaperiyar is presently maintained at 136 feet against its FRL of 152 feet. This is one of the main grounds of contention between Kerala and Tamil Nadu for the past forty years. Tamil Nadu claims that they have completed the strengthening works suggested by CWC, and, therefore, are entitled to restore the water level to its original height. Kerala fears that the century-old structure is no longer safe to withstand water above 136 feet. The SC verdict of 2006 permitting the raising of the water level to 142 feet, and the subsequent amendment of the Irrigation and Water Conservation Act of Kerala freezing the water level at Mullaperiyar permanently at 136 feet have further aggravated the conflict.

Presently Tamil Nadu diverts about 640 Mm^3 (22.5 tmc feet) of water from the Periyar Reservoir. The reduction in the water level since 1970s, according to Tamil Nadu, has led to severe crop failure in 8000 ha of agricultural lands, and drought-like situation in the ayacut solely dependent on water from the Mullaperiyar dam. Kerala contends this argument by pointing out that the Mullaperiyar waters are now being used to irrigate more land than what it was originally designed for. Even after the reduction in the water level to 136 feet, the original ayacut of the Periyar project has more than doubled from 36,423 ha to 81,036 ha.

Tamil Nadu on the other hand asserts that the increased ayacut area is the result of the better water management practices on their side. Tamil Nadu alleges that the real motive of Kerala behind the reduction in the Mullaperiyar water level is to increase the water availability at the Idukki HEP of Kerala located downstream of the Mullaperiyar dam. It is argued that if the storage depth of Mullaperiyar dam is increased from 136 feet to 152 feet Tamil Nadu can divert an additional 320 Mm^3 (11.25 tmc feet) of water from the reservoir, and consequently the storage of Idukki reservoir would get reduced.

Kerala points out that the data maintained by Tamil Nadu Public Works Department (PWD) itself depicts an increase in water flow from Mullaperiyar to Tamil Nadu even after the reduction of the reservoir level. Kerala claims that at the present level of 136 feet, Tamil Nadu can divert more than 95 percent of the water from Mullaperiyar which has resulted in reduced spill into the reservoir of Idukki HEP in Kerala. Kerala further alleges that what Tamil Nadu is actually concerned about is the reduction in electricity generation at the Periyar HEP due to the reduced water level.

Ironically, both states are trying to justify their respective stands on the issue of water level in the dam by their own interpretations of the same statistical database maintained by Govt. of Tamil Nadu on water availability, water diversion, spill, electricity generation, ayacut and drought-affected area of the Mullaperiyar Project.

Safety of a century-old structure

The primary issue with regard to Mullaperiyar for Kerala is related to the safety of a structure that has outlived its useful life, and which was built during an era when dam building was in its infancy. The leaks detected in the dam structure, leaching of the surki mortar from the structure, intermittent seismic disturbances in the area, and severe floods during strong NE monsoon years and related disasters have increased the concerns of Kerala. The breach of the dam, according to Kerala, would wash away a stretch of about 25 km between Mullaperiyar and Idukki dam affecting a population of around 1 lakh people. Kerala also fears that the Idukki dam may not be able to withstand the onslaught of the Mullaperiyar waters in which case a major disaster would ensue that would destroy the downstream dense settlements affecting millions of inhabitants.

CWC on being appraised of the situation by Kerala in 1979 had without delay suggested emergency, medium and long term measures to strengthen the dam after which the dam could be considered safe. The conflict arises because Tamil Nadu claiming completion of the strengthening works suggested by CWC demands the restoration of the dam to its full capacity which is being vehemently opposed by Kerala. Kerala expressing its

dissent with the Expert Committee appraisal and consequent suggestion to raise the water level up to 142 feet appointed independent experts to study the various safety aspects of the dam. These studies affirmed the dam as unsafe which has strengthened the stand of Kerala. Kerala also alleges that no repair work has been carried out below 112 feet due to standing water.

Tamil Nadu on the other hand applies the Expert Committee findings, and the subsequent SC verdict to assert that the dam is safe. Tamil Nadu, therefore, sees Kerala's arguments on dam safety as a ploy to deny them water. They argue that after the renovation works, the dam is as good as new, and, that, even if there is a break, the downstream dam at Idukki will be able to contain the waters, remaining silent on the stretch that lies upstream of the Idukki dam. This silence infuriates Kerala who even went to the length of pointing out that there is a large Tamil speaking population in this stretch. The levity with which Tamil Nadu approaches the issue of a possible dam breach makes Kerala adamantly hold on to their stand of not raising the water level. Kerala feels that it is not right to overtax a century old structure at the cost of the life of the people of the donor state. Kerala points out that a dam failure and its ramifications would make it impossible for Tamil Nadu to enjoy the benefits of the present deed. Both states accuse each other of being callous to the fate of their people.

New dam - new deed?

Another major issue of contention at present is the proposal for a new dam replacing the old structure, which Kerala is vociferously demanding for, and Tamil Nadu is vehemently opposing. The suggestion for a new dam had come up quiet early in the discussions between the two states mediated by the Centre. Tamil Nadu had right from the start expressed distaste with that solution, and recently opposed the decision of Ministry of Environment and Forests (MoEF) to sanction the survey for a new dam. Kerala argues that it is imperative to replace the old dam since it will not in any case survive the deed period of 999 years. Tamil Nadu on the contrary feels that a new dam will eventually replace its historic rights even though Kerala claims that it will ensure water to Tamil Nadu.

What remains unarticulated in the discussions on a new dam is whether the old deed steeped in controversy would remain in force for the new dam as well. When this question was raised by the SC during the hearing in 2009, both the states remained silent on the issue. Kerala aims for a new contractual agreement which would ensure its rightful share of benefits (denied to it until now by an unjust treaty) derived from an interstate river water diversion. Tamil Nadu, for whom, the present arrangement under the 1886 deed is the best possible scenario, fears the eventuality of a new deed that would follow a new dam.

The present dam, though situated within Kerala, is now fully controlled by Tamil Nadu in accordance to the Periyar lease deed of 1886 amended without much change in 1970. A new dam, Tamil Nadu doubts, would not maintain this status quo. In a conciliatory circumstance in the SC, Tamil Nadu suggested in 2009 that the new dam possibility can be considered if Tamil Nadu gets full control over it. Moreover, it was ready to part with the electricity that is generated at Periyar HEP to Kerala provided the new dam is entrusted to Tamil Nadu. Even this initial step towards reconciliation was aborted later due to intense political pressure in Tamil Nadu where acceptance of a new dam is perceived as a means to make them accept a new agreement which would threaten the established use of water there for over a century.

Implicit and emergent issues

Besides these issues over which disputes rage, there are other concerns that can be discerned which are either implicit issues that underlie the primary conflict or are derived issues which have resulted out of the primary issues discussed above.

The Periyar lease deed: Kerala abjures the historic injustice of the Periyar lease deed 1886, and its amendment in 1970, which provides absolute rights to Tamil Nadu over waters of a tributary on which it has no riparian rights. Moreover, there is also a longstanding grievance that the share of the benefits given to the donor state, as per the deed, is highly inadequate compared to the benefits derived by Tamil Nadu through the use of the resource. Even the amendment of the deed in 1970 did not have provisions for review of the deed or compensation

over time. The strong demand from Kerala for a new dam can be regarded as an attempt to rectify these deficiencies with regards to the existing deed along with allaying its security concerns. On the other hand, Tamil Nadu is content with the present deed as it ensures them full control and rights over the Mullaperiyar waters at a nominal compensation and risk. The current conflicts over the safety of the dam, raising of the water level and demand for a new dam are all coloured by the silent tussle over a one-sided agreement, the grievances that it has triggered in the donor state, and the patterns of established usage that are fervently held onto in the recipient state.

Environmental concerns: Mullaperiyar dam is located within the PTR in the Southern Western Ghats. The environmental concern that has received the attention of Kerala so far is with regard to the submergence of the reservoir fringe area that has emerged (11.219 sq.km) after lowering of the water level to 136 feet from 152 feet. A study on the impact of raising of water level in the Mullaperiyar reservoir of the PTR carried out in 2001 reported that vegetation and wildlife habitat in the PTR will be adversely affected if the reservoir level is raised. The report also indicates the adverse impact on the revenue generated from tourism related activities in the area. Tamil Nadu assuages these concerns of Kerala by pointing out that the area that would be submerged is only meagre (1.4% of the PTR), and will not drastically alter the ecology of the region. Tamil Nadu also nurses the opinion that Kerala's real concern is about the new human settlements and resorts that have cropped up in the reservoir area that faces threat of submergence if the reservoir level is raised back.

The issue that is never addressed by both sides is the downstream environmental impacts due to the complete diversion of a tributary which has resulted in drying up of the river course for more than 25 km below the Mullaperiyar dam for a period of about six months. There is scant concern on both sides to ensure even minimum flows in this river which nurtures priceless biological hotspots of the High Range Western Ghats including the PTR. The environmental flow requirements of altered rivers are now being recognised all over the world as a crucial component of water allocations to reduce downstream environmental impacts. This important area has not been a point of discussion in the present conflict so far.

Interstate relations: As the original conflict over Mullaperiyar deepened over time leading to frayed nerves on both sides of the border, the repercussions of it spread into various other realms of relations between the two states. This was openly brought into the public sphere by the time the legal battle between the two states was in full swing in the SC during 2000, and reached its peak in 2006 after Kerala passed the controversial amendment. Such emergent secondary issues revolve around the economic interdependence between the two states. Interstate and intrastate political power struggles has had Mullaperiyar as a focal point.

Threats to curtail the food supply to Kerala and obstruct transport between the states were made by various political factions in Tamil Nadu as a strategy to pressurise Kerala to agree to raise the water level in the Mullaperiyar dam. This rose to a unanimous political call for public agitation in 2006 when all national highways, artillery roads and rails to Kerala were blocked in Tamil Nadu as a protest against the amendment. The proposal for a new dam has again sparked off similar moves in Tamil Nadu towards 'economic blockade'. According to Tamil Nadu, the dependence of Kerala's food supply on it justifies its claim of rights over Kerala's waters. Kerala counters this by asserting that the farmers of Tamil Nadu equally depend on Kerala as the chief market for their produce, so that any move to block the agricultural produces would adversely affect the farming communities of Tamil Nadu as well.

Competence of technical and scientific authority: The Mullaperiyar has thrown up issues of a wider ambit beyond the two states involved in the conflict. The technical issues related to safety of the dam were raised before the technical authority at the Centre which acted by restricting the water level and suggesting dam-strengthening measures. A power play between Kerala and the Centre over the authority to decide on the safety of the dam began when the CWC led expert committee with representatives from both the states failed to reach an amicable and unanimous solution on the issue of dam safety. Dissatisfied with the decision of the expert committee of Ministry of Water Resources (MoWR), Kerala entrusted national level institutes to conduct independent assessments, and moreover enacted an act to restrict the water level at Mullaperiyar to ensure

its safety. These actions have furthered the trouble brewing between Tamil Nadu and Kerala.

Territorial issues: The location of Mullaperiyar dam owned by one state on leased lands within the territory of another state has itself been a point of friction between the two governments from time to time. There have been reported clashes even prior to 1979 between the Forest Department of Kerala and PWD of Tamil Nadu regarding various aspects such as quarrying, cultivation, and denudation of forests in these leased lands. Forest Department of Kerala had also raised objections to quarrying operations in the PTR for dam strengthening works during the 1990s which had caused considerable tension. The law and order of the area vested with the Kerala Police had also flared up as an issue of contention. Though these clashes are seemingly minor and unrelated to the main conflict, the issue of operation and maintenance of a structure within another state's administrative boundary has had huge implications in setting the backdrop of the conflict.

Growing water scarcity: In both the states, water is increasingly becoming a scarce and contested resource. In Tamil Nadu, dealing with water scarcity has been a continuous historic struggle. Kerala on the other hand has started experiencing widespread ravages of water shortage only from the past few decades which has led to a greater appreciation and demand for its water resources. Many of the interstate projects through which Tamil Nadu avails water for its arid lands were conceived during colonial rule. The increasing water demand and scarcity in these neighbouring states is now leading towards a redefinition of what was once considered to be 'surplus' and 'unutilised' waters.

5. Conflict resolution: institutions involved and options accessed

Interstate disputes over water in India are now being mostly resolved through interstate water dispute tribunals. Setting up a tribunal has not yet been attempted in the case of Mullaperiyar, since the dispute at present is neither over resource sharing nor over interstate water rights. In the Mullaperiyar conflict, the major institutional players, right from the start, had been the respective state governments represented by their Chief Ministers and the

departments in charge of water resources. Failure to resolve the issue at the state level necessitated legal recourse, and paved the entry of central agencies of MoWR and the CWC at the insistence of the SC. All the attempted options by these agencies has had limited success due to heavy political biases and interference, the non-involvement of the stakeholders in the resolution process, and, most importantly, a limited and rigid vision of the conflict and its implications. As a result, there is growing rancour about the resolution process among the public on both sides of the border fed by incomplete and distorted information and political propaganda.

The Periyar lease deed of 1886, makes the provision for arbitration as the mode of dispute resolution. This provision had to be invoked very early in the history of Mullaperiyar, between the Madras Presidency and the Travancore State, over the dispute on right to power generation. The amended lease deed of 1970 did not make any modification of this provision. But arbitration was never again attempted for resolving the dispute between the states of Tamil Nadu and Kerala. Interstate efforts at direct negotiations for dispute resolution during various crest periods in the conflict met with little success as both the sides were trenchant in their arguments. Even technical committees setup by the respective states did not arrive at a consensus. Moreover, the suggestions put forth for further negotiations by one state were not acceptable to the other.

At the centre, the MoWR is responsible for the coordination, mediation and facilitation with regard to the resolution of differences or disputes relating to interstate rivers, and in some instances, the overseeing of the implementation of interstate projects. Since the Mullaperiyar is not an interstate river, and there is no sharing of waters between the two states, MoWR was reluctant to involve itself in mediation between the two states. The attempts at negotiation by the MoWR had been most often forced upon by SC directives. The success of these half-hearted attempts was always constrained due to the politics of coalition. The concerned states also did not approach the negotiation table with an open mind so that in truth these proved to be merely buying for time before the SC could be approached again.

The CWC, functioning under the MoWR, is the entrusted body to advise the GoI regarding rights and disputes between different states related to river valley development and dam safety. In the case of Mullaperiyar, CWC-led Expert Committee's inability to convince Kerala regarding the safety of the dam initiated state sponsored independent studies which contradicted the findings of the Expert Committee. The Indian Institutes of Technology at Delhi and Roorkee, and Indian Institute of Science, Bangalore had conducted studies related to hydrological and seismic safety of the Mullaperiyar dam. These institutions have played a major role in bolstering Kerala's position to be able to scientifically challenge the CWC, deemed as having the final word in dam safety in the country.

The crux of the present conflict over dam safety rests on the decision of the CWC led Expert Committee that the Mullaperiyar dam is safe to hold waters up to 142 feet, and, later up to 152 feet. Even the SC order of 2006 is based on this assessment. In a dispute where technical evaluations decide the verity of arguments, it is imperative that the technical authority vested with the responsibility to conduct an infallible assessment, which, in the case of Mullaperiyar has allegedly not happened. In such a situation, the decisions made on contested technical evaluations may make the issue complicated and irresolvable.

The role that legal institutions can take in interstate dispute resolutions is limited because of the multifaceted issues that underlie a conflict. The extent to which the courts can go into the merits of a case is also restricted. No judgment can ever be mutually acceptable, which, therefore, fails to resolve the conflict in the long- term. But even then, in the forty year conflict over Mullaperiyar, the legal option is found to be the most heavily relied upon and thoroughly explored. After Tamil Nadu claimed completion of the CWC suggested strengthening measures by the mid-1990s, there was a period of intense tension in both the states over the return to status quo of 152 feet FRL which culminated in the states taking the legal recourse.

The SC has had a critical role to play in directing the course of the dispute over the years through exploring the possibilities for various options such as centre-mediated negotiations, expert and empowered committees, and more importantly, by

bringing out latent issues in the conflict. The environmental concerns, grievances with the 1886 treaty, possibility of a new dam, rights over resources, and the purview of interstate water dispute tribunal were brought out when these were thrashed out during the hearing process. It is unfortunate that the only platform where these various aspects of the conflict are revealed is the highly exclusive forum of the SC. Legal recourses have also proved to be time consuming and expensive for both the states' exchequers.

Various socio-political institutions on both sides of the border which include farmers' organisations in the state of Tamil Nadu, civil society organisations spearheading the protest movement in Kerala, and various political parties in both the states have been instrumental in directing and enlivening the conflict at various points of time. There are incipient attempts at the civil society level to start off multi-stakeholder discussions in the Mullaperiyar conflict to bring together the various stakeholders, and, to explore common grounds through a process of dialogue. If this process can persuade the multiple stakeholders in both the states to come together in a common platform, it can be a promising alternative to the present conflict resolution process.

Numerous suggestions and alternate options for the resolution of the conflict have emerged from various quarters especially after the SC verdict of 2006 failed to resolve the issue amicably. The proposal for a new dam put forth by the Kerala Government, alternatives to the new dam proposal such as the suggestions for an integrated use of Vaigai river system with a small dam near Varshanad to feed Vaigai River expressed by Cumbum Basin Farmers' Association, proposals for sharing of electricity generated at Periyar Power house with Kerala, redesigning the conveyance tunnel so that there is minimum storage behind the dam at any given point of time, thus, establishing the Mullaperiyar as a diversion rather than a storage structure, setting up of a tripartite board including representatives of both the states and the centre to oversee reservoir operations suggested by the Forum for Policy dialogue on Water Conflicts in India are some of the options that have surfaced so far.

A process of demand adjustment in the ayacut to reduce dependence on Mullaperiyar waters has also been advocated. It has been further pointed out that long term solution to conflict can only be achieved through an adoption of ecosystem-based river basin planning that would take cognisance of increasing water scarcity and other environmental concerns that have not been addressed in the present conflict resolution process. All these and other alternatives that may emerge in future in the various platforms will have to be rigorously scrutinised for arriving at the best possible solution.

To understand the possible options that can lead to a creative and sustainable solution to the Mullaperiyar conflict, there is a need to discuss all the implicit issues of the conflict and points of divergence of mutual interests between the two states in public fora in detail. Therefore, the quest for new options would have to be preceded by, 1) the collection, documentation and public dissemination of the existing documents on the subject; 2) independent technical studies to verify the claims and charges of both the states; and 3) an open discussion on the Periyar Lease Deed and its amendments to lead towards the framework for a new agreement that would address the grievances and insecurities of both the states.

6. Implications for river basin based management

The National Water Policy 2002 recommends that appropriate river basin organisations should be established for the planned development and management of a river basin as a whole so that the available water resources are determined and put to optimum use having regard to existing agreements/awards (GoI 2002). The conflict raging over Mullaperiyar brings into focus that the river basin as a possible framework for future water management and conflict resolution are overlaid with various boundaries of interest. These interests of a spatial, temporal and institutional nature 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. 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 proffered intentions on either side have etched their own flow paths of conflict. It is a classic situation where the conflicts over the resource go way beyond the river basin boundaries to become statements of public sentiments in the states. It, therefore, becomes important to reconcile river basin imperatives with these wider interest boundaries that are created through inter-basin water transfers, and the inevitable linking of the basins involved.

Pani (2010) observes that a multi-dimensional and inclusive approach which recognises the divergence between the basin and the non-basin areas that utilise the waters is required to resolve interstate 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. This conception has to be grounded in a historical perspective that recognises the irrefutable interconnections between the basins. It also has to take into account the fact that basin water demands, and the wider boundaries of disparate state and political interests would always influence basin-based decisions. The Mullaperiyar conflict forewarns us of the immense challenges to river basin 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.

7. Concluding remarks

The Mullaperiyar conflict is yet to become a conflict over allocation rights of shared waters. The present conflict over the safety over the century-old dam, and the raising of the water level hide within it various implicit issues that form the turbulent undercurrents of the Mullaperiyar conflict. The failure of the

resolution mechanisms used until now 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 as well 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. This framework will also need to take into account the completely different notions and priorities of water as a resource and as a sentiment that exists in the arid basin of Vaigai, and the politics of the deeply ingrained notion of 'surplus' waters in the monsoon-fed, west-flowing rivers of the Western Ghats such as Periyar. The rapid exhaustion of river basin resources in the light of the ever increasing pressure on water in the country, which is the inherent rationale behind all water-related conflicts, signalises the urgent need to evolve a framework which can renegotiate recalcitrant stands in the ultimate interest of the river from the perspective of sustainability.

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A note on competing claims over water resources in Kullu

Arti Gupta and Romesh Chander

1. Prologue

This paper deals with water in the fragile/marginal resource areas such as the mountains. In these areas sustainability or rather unsustainability, is not a matter of probability, but an already felt reality. The importance of natural resources is more critical to societies which are at a relatively low-level of development. People have to conform their livelihood and lifestyle to the setting of nature. The sustainable use of natural resources to attain high level of human development has become imperative. In the mountainous areas a little change or variation in natural or climatic conditions can result in large-scale changes in the entire ecosystem. Mountainous areas are fragile ecosystems, which are globally important as they are water towers of the earth's surface, rich in biological diversity, popular destinations for recreations, and are areas of cultural heritage. In this paper, we look at river Beas in Kullu Valley and the effect of development on its water resources. After a brief discussion on the key issues involved in the mainstream debate on water and sustainability, the paper presents a few negative changes, or indicators, relating to the region (Kullu). The negative changes are a consequence of current patterns of resource use that are at work in the region.

Introduction and the setting

Living with the risk of natural hazards is part of everyday life in the Himalayas. Yet, when a disaster or catastrophe occurs, it is often held up to scrutiny as if it were something unusual or unexpected. In the Himalayas, and in the adjacent regions, evaluation of floods and other disasters reveals an increasing frequency of these events and their relationship with processes of degradation of natural resources, primarily deforestation, and the loss of biodiversity in the Himalayan environment. Degradation is synonymous with destruction of forests and other vegetation cover, leading to increased runoff, erosion, land

instability, and gushing stream flows. This in turn, is thought to to be the reason of increase in floods and erosion –sedimentation events downstream, within and beyond the mountains.

There is growing evidence that points to the accelerating degradation of mountain ecosystems, and the resulting impoverishment of mountain inhabitants. Expressed as potential indicators of sustainability, the literature highlights changes over time that relate to such factors as crop yields, the availability of traditional mountain products, the economic well-being of mountain people, and the overall condition of environmental and natural resources.

Kullu: a brief overview

This paper is based on the findings in Kullu district of Himachal Pradesh forming a transitional zone between lower and greater Himalayas. The name Kullu (literally - "land of the snowy mountains"), has been identified with Kuluta, the earliest mention of which is on the coins of the 1st or 2nd century (Government of Himachal Pradesh 2000). Kullu district forms a transitional zone between the lesser and greater Himalayas in northwestern India. Kullu was made into a separate district in 1963. Prior to that it was a tehsil of Kangra district. The district is sparsely populated, and centrally located in the state. The geographical extent of the district is between 31 20'25" North latitude, and 76 56' 30" to 77 52'20" East longitude (*ibid*). It is bounded on the east and north by the Lahul and Spiti districts, on the southeast by the Kinnaur district, on the south by the Shimla district, on the southwest and west by the Mandi district, and on the northwest by the Kangra district.

Kullu district is divided into five community development blocks, namely, Naggar, Kullu, Banjar, Ani, and Nermand. Kullu is the administrative district headquarters which is located at an altitude of 1200 meters on the confluence of the Sarvary rivulet and the Beas River. According to the 2001 census, total human population of the district of Kullu is recorded to be 381571. Of this population 51.8% are males and 48.1% females. The rural population of the district accounts for 92.1%, while only 7.9 % of the population is urban. The Scheduled Caste population constitutes 28.2% of the total human population while Scheduled

Tribes constitute 2.97% of the total population of the district. Total literacy rate in the district is 72.9%; male literacy is 85.7% and female literacy is 65.7%.

Hindus constitute the great majority of the population, with some 96 percent of the population of Kullu District belonging to the religion. Scheduled Tribes include the Gaddi, who are transhumant sheep and goat pastoralists, and the Gujjars, who are transhumant buffalo herders. Buddhist refugees from Tibet are found in some numbers in the study area. There is considerable seasonal movement of non-resident labor, mainly from Nepal and Kashmir, into the Kullu Valley in the summer months. The sex-ratio of Kullu district is 927. The density of population in the district is 68 persons per sq km.

The Hindu culture of Kullu is distinct from Hindu culture of the plains and from tribal cultures. The people and culture of the Western Himalayas in general, and of the Kullu Valley in particular, are identified by the collective term, Pahari (literally, "of the mountains") (Berreman 1972). The roots of the Pahari dialects are traceable to Sanskrit (Hutchinson and Vogel 1993). These dialects are related to Indo-Aryan languages (Berreman 1970). The dominant Rajput caste has several divisions within it. Some subcastes within the Rajput caste are believed to have come from the plains while other subcastes have ancient roots in the Kullu region. For example, the Thakurs, as ancient barons of the hills, go back before the first century AD. Berreman (1970) suggests that the Scheduled Castes of the region are indigenous to the area, whereas Hutchison and Vogel (1933) suggest that they were largely brought in as laborers by the landholders of the region. The history of the region is not well understood, as there are few records aside from those that chronicle the rule of the Rajas dating back to as early as the first century AD (*ibid*).

The culture of the people of the Kullu Valley closely follows the distinctions Berreman (1972) makes between Pahari culture and plains culture. One of the most striking characteristics is a distinct caste system based on a major division between the dominant Rajput caste and scheduled castes ("untouchable" or the service castes). Those belonging to the Rajput caste are the primary landowners in the Valley. Also characteristic of the Kullu Valley Pahari culture is the active participation of

women as decision-makers in the agricultural system, and to some degree in village institutions. The marriage system is not based on dowry but on a more equal sharing between the households. In general, present day Pahari culture throughout the Himalayan region shares basic cultural patterns. Diversity abounds in dialect, house styles, and range of castes even within short distances throughout the Himalayas (Berreman 1970). Denniston (1993) describes the Himalayas as a vertical archipelago of ethnic and cultural diversity. But these diverse cultures are changing rapidly. Cultural transformation in the Kullu Valley is being driven by economic changes related to the development of export agriculture and tourism industries. It is also changing with increased contact with the plains culture through television, radio and tourism. The Kullu Valley, with its mix of traditional Pahari and other Hindu cultures, tourists, tribal people, Tibetans, Nepalis and Kashmiris, presents a complex and dynamic cultural environment.

The Beas River

The Beas River is the main lifeline of the Kullu district along which the settlements are located. Beas is an important contributory river of the lndus System. It is the only tributary of the system confined to India. The 460 km long river originates from two sources, Beas Kund on the South and a cave of Vyas Rishi on the right of Rohtang Pass at an elevation of 4350 meters. The two streams meet at Palchan village, 10 km north of Manali to form river Beas.

The river was known as Arji-kiya in pre-Mahabharata times, and then onwards as Vipasa to ancient Indians. The present name Beas is thought to be a corruption of the word Vyas, the name of saint Vyasa, the author of the great epic Mahabharata, who meditated on its banks. The Greek historians called it Hyphasis. It is the second most important river of Himachal Pradesh, and has a catchment area of 13,663 km^2. The entire Kullu district is covered by an intricate network of the drainage lines, nearly all of which ultimately feed the Beas River. It is fed by several tributaries including the Parbati, the Hurla, the Sainj, the Tirthan, the Uhl, the Sakeri, the Luni, the Awa, the Banganga, the Manuni, the Guj and the Chaki.

It flows from north to south-west over a distance of 286 km in Himachal Pradesh. From the point of its origin, The Beas flows southwards for a distance of 120 kilometers till it reaches Aut near Larji, from where it takes a westward turn piercing through the Dhauladhar range and enters the Mandi district. (Government of Himachal Pradesh 2000; pp. 8). The river is steep in headwaters, and the first 120 kilometers of its flow have an average fall of one in 40. Downstream it decreases rapidly to one in 500 in the Beas Valley. The Beas catchment region has an average annual silt production rate of 19.35 million ton, with an increase rate of 46% in five years. With a basin threshold of 500 Sq. Km, the Beas river basin gets divided into 17 sub-basins.[1]

There is a lot of seasonal fluctuation in the water level of River Beas. It is the lowest in January. However with the melting of snow in the later months, the water level increases during the months of March, April, May and June. The highest flow is in August when it rains heavily. During August and September, the river is generally in spate, and on occasions causes floods in the low lying areas of its course. The total mean annual run-off of Beas is 16,763 million cumecs which is being utilised extensively for various purposes as the waters of the river are allotted to India along with that of river Sutlej and Ravi under the Indus Water Treaty between India and Pakistan.

The river is subjected to first manipulation at village Pandoh in Mandi district within HP where it is dammed into the Pandoh reservoir with an earth-cum-rock fill dam. This dam is 74.37 meters high, involving the placement of 1.58 million cumecs of water. Simultaneously, a major chunk of its resources, 4716 cumecs of water is diverted to River Sutlej through the Beas-Sutlej Link canal in the form of tunnel (12.38 km long, 8.15m. wide) and lined canal (11.8 km long, 9.14 m diameter). This is the longest hydroelectric tunneling project in the country so far. The river is again dammed at village Pong in Kangra district to form the Pong reservoir, again an earth-cum-rock fill reservoir having water spread area of 6000 to 24000 ha. These changes allow the resources to be utilised for multipurpose activity, mainly power generation. After leaving Pong Dam, the river enters plains of Punjab at Talwara.

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[1] Climate Change Adaptation Focused Sustainable Water Resources Strategy for Himachal Pradesh, A report prepared for ADB Govt. of India ,HP 2010.

Climate

The Kullu district has a mountainous terrain with valleys, ridges and peaks. The climate of different parts of the district depends largely on the elevation. The climate of the low altitude areas of the district near the southwestern border is somewhat similar to the adjoining plains of Punjab. The year may be divided into four seasons. The period from November to March is winter season. The next three months, April to June, form the summer season. The following period lasting up to about the middle of September is the monsoon season. The latter half of September and October form the transition period from monsoons to winters.

With gain in elevation in the Kullu Valley, temperature decreases. Precipitation, particularly snowfall, may increase as well, but no measured data are available to support this. At Rohtang Pass (4,200 m), a well-developed snow cover persists from November to July. Soil and biotic conditions at this elevation are indicative of a "periglacial" climate with a mean annual temperature of 0° or less. Snow may persist throughout the year in gullies and other protected areas where it accumulates by wind-drifting during the winter. Below 4,200 meters the amount and duration of snow cover decreases.

Climatic tree line in the Upper Beas watershed is at about 3,500 meters. Above this elevation are extensive areas of alpine tundra vegetation that serve as a traditional resource base for summer transhumance grazing and for the collection of medicinal plants. Below the tree line is a mixed deciduous/coniferous forest interspersed with open "meadow" areas, grading into extensive areas of Himalayan coniferous forest at lower elevations. Lower on the valley slopes, the forest grades into small pockets of temperate forests and large areas converted into agricultural uses, including fodder production, orchards, horticulture, grain and vegetables and, at lower elevations, rice cultivation.

The morphology of the Kullu Valley has been shaped by glaciations which is responsible for its broad, U-shaped cross-sectional profile. Much of the land in the valley floor and lower slopes is composed of alluvium in the form of terraces and fans. These features serve as the principal sites for traditional settlements. The Beas River and its major tributaries have incised

into the alluvial deposits. The Beas has created a floodplain of variable width that is composed of coarse-grained deposits of sands, gravels and boulders, all indicative of variable, high-energy discharges.

During the cold season, western disturbances affect the weather over the district. Thunderstorms occur mainly during the period from March to October. The period from April to June has the maximum incidence of thunderstorms. The thunderstorms in the cold season are occasionally associated with hail. Fog occurs occasionally during the cold season, particularly in the valley. The year 1994 was a year of cloudbursts and flashfloods which destroyed property worth crores of rupees in the district. The cloudbursts occurred one after the other.

Cropping pattern

For generations Kullu valley served as an important overland trade route between Punjab and northern India on one hand, and Tibet, Ladakh, Lahaul, Zanskar and Spiti on the other. Before the colonial era prohibitions, Kullu was an important producer and exporter of opium, the first lucrative cash crop. The area has always been, and remains, an important producer of cannabis and its products. British settlers introduced relatively hard and storable fruits such as apples which became minor exports in the latter part of the nineteenth and twentieth centuries. The dominant economy of the area remained focused on agriculture. Cultivation was possible in small terraced holdings in the high hills, and the stream basins in most of the parts of the district. Each village has a rich resource area which usually includes a series of zones: mixed-use lands near the village, including orchards and some grazing land; protected forests on the upper slopes of the mountains; and, forest meadows and alpine grazing land. The economy of the people in Kullu is basically agrarian with more than 80% of the people engaged in agrarian activities. Forests occupy a predominant place in the economy of the district. But, presently, land under forest cover is far less than what is essential for maintaining the stability of the environment and for ecological sustenance (GoHP 2000).

Natural resources and the environment are currently under intense pressures in the Kullu district, especially in the

upper reaches of the Beas River Valley. The pressures arise from development in four main sectors: tourism, agriculture, hydro-electricity, and mining. The impact that development in each of these sectors is having on the ecologically fragile valley is very evident. Development activities along the road between Kullu (town) and Manali are an environmental disaster.

Development in the agricultural sector is manifest in changes in agricultural systems and transformations in the landscape (Bhati and Singh 1987). Apple, plum and other orchards are slowly replacing small-scale terrace cultivation, which is characteristic of traditional local systems in Kullu. This process has contributed to the replacement of subsistence crops with cash crops, and the integration of local agricultural systems with the broader cash economy.

Rice: In Kullu the most common varieties of rice are matali, jatu and mahuri. These are sown throughout the valley up to an elevation of a little under 1800 meters. A better yield is obtained by planting than by the broadcast system, but it requires much more work.

Maize: This is a major kharif crop mostly raised in the middle zone, in areas between 1000 to 1500 meters above the sea level, and is sown in May-June. The crop is never irrigated in Kullu, and is generally harvested in September–October. For the last few years the cultivators have taken up the cultivation of soybean mixed with maize which has resulted in the increased production not only of maize but also in additional yields of soybean from the same area.

Tobacco: Only hukka tobacco is grown as a kharif crop in Kullu, generally in richly manured plots close to the house. It is grown mainly for home consumption, and in some places for the market as well as it is a lucrative crop.

Hemp: Hemp is grown at some places in the high lying areas on the slopes on both sides of Jalori ridge where excessive rainfall is favorable to the development of this excellent fiber. Most of the fiber is used to make ropes and grass shoes (pulas). However the cultivation of hemp is on a decline.

Wheat and barley: Sowing of wheat and barley begins early in September in the higher elevations, towards the end of November in the balh, and between these dates at intermediate elevations. Both crops benefit in the highlands by being under snow for a short time, each root puts out more stems as a consequence. Wheat is the more important of the two as a cash crop, and has more area under cultivation.

Potatoes: This crop has become quite popular and important among farmers because it gives them a handsome income in cash while demanding comparatively less labour.

Opium / poppy: The most paying produce in the *Rabi* harvest is opium, but the cultivation and manufacture are laborious processes. The earlier in November poppy is sown, the better. The cultivator generally sows several small plots one after the other, so that the collection of opium may not be such a tax on the energies of his family as it would be if the poppies in all the plots were ready at the same time. The plots are highly manured before sowing, and also more than once after the young plants have come up. A fringe of barley is often raised along the fields so that the barley can be reaped earlier than the opium in such a way that a path is left by which the field may be visited without injuring the crop of opium. The opium is extracted between the end of May and the end of June according to the elevation. Poppy is not much cultivated in upper Kullu where there is much irrigated land because the time for collecting the opium corresponds with the rice planting season. There is scarcely a village in the opium growing kothis which does not produce sufficient opium to pay its revenue, and the total value of the annual yield of the drug in the tehsils is probably double their present revenue.

Mustard: largely grown in the rabi bed, it is sown late, and reaped towards the end of April. The oil was earlier bartered for wool in Lahul.

The opening up of Kullu by a motor road through the Largi-Mandi gorge has given a stimulus to horticulture in Kullu along with an increased inflow of tourists, adding to the incomes of the valley people. Natural resources and the environment are currently under intense pressures in the Kullu District, especially

in the upper reaches of the Beas River Valley. The pressures arise from development in four main sectors: tourism, agriculture, hydroelectricity and mining. The impact that development in each of these sectors is having on the ecologically fragile valley is very evident, in the conflict it has caused.

2. Land use and socioeconomic change

In the district of Kullu as a whole, unofficial estimates cited by the ODA report (1994), suggest that cultivated land is 10 percent of the total area, forest land 40 percent, grazing land 30 percent, and rocky and inaccessible slopes 20 percent. Each village has a resource area which usually includes a series of zones: agricultural land on the valley bottom; mixed-use land, including some orchards and grazing land, upslope from the village; protected forest on the upper slopes and mountains; and forest meadows and alpine grazing land.

The overall land and resource use system is an integrated system in the district because of the interdependence of forests, pastures and farms. Soil fertility and agricultural productivity depend on manure and compost from the livestock population. The livestock in turn depends on grazing lands and forests for the provision of fodder, tree fodder and bedding. These relationships are well known. For example, the interaction between agricultural and forest ecosystems have been quantified in terms of energy flows (Pandey and Singh 1984). Since private agricultural holdings are small, the household economy strongly depends on access to common or state-owned forest and grazing land. These dependencies are reflected in the annual work patterns of the people. Men are involved mainly in ploughing (in the months of chetar and shoj, just before planting), in the apple harvest, and sporadically in other activities as well.

Maize in *Kharif* and wheat in *Rabi* seasons are the most important food grain crops grown in kullu. The local production of rice is small relative to needs, and rice is the main agricultural import. For most other crops, the traditional pattern of self-reliance is still evident. An average household may sell its surplus production in some years and buy as needed in others, but remains self-sufficient for a range of crops from grains and vegetables to oil seeds, but not for the full range of agricultural

products needed. In addition to crops, agricultural land, including land under orchards, also produces fodder for animals. This fodder comes from plants weeded from the fields, from cut grass, and from crop residue after harvest.

One of the characteristics of Kullu Valley agricultural systems is small-scale terrace cultivation (Bhati and Singh 1987). Another characteristic is the distribution of the households' agricultural land holdings in the form of discrete parcels through the village area. Some of the parcels are used for a single crop, some are used for two or more crops grown separately within a single parcel, and some are used for intercropping.

In general, the agricultural systems of the area are characterised by high crop biodiversity. There are no extensive stands of any one crop, but mixes exist of such ecologically compatible plants as corn and bean (bean fixes nitrogen for corn), and orchard-based agroforestry. Apple trees are intercropped with grasses and legumes, a practice known to improve growth rates of apple trees, reduce erosion losses, and increase total yields from the land (Tejwani 1994). The origin of the pattern of discrete land parcels is no doubt complex, but its functional significance is probably related to the provision of a diversity of subsistence produce for each household. It also serves to maintain crop genetic diversity, and to minimise the risk of crop failure.

Development in the agricultural sector is manifested by changes in the agricultural systems and attendant transformations in the landscape (Bhati and Singh 1987). Apple, plum and other orchards are slowly replacing small-scale terrace cultivation, which is characteristic of traditional local systems in Kullu. Among vegetable crops, cabbage, cauliflower, tomato, are important fresh vegetables. Farmers are mainly producing seeds of cabbage, cauliflower, carrot, radish and onion on a commercial scale. The cultivation of garlic, a cash crop, is also being taken up by the farmers at a large scale. All this has contributed to the replacement of subsistence crops with cash crops, and the integration of local agricultural systems with the broader cash economy.

3. Development initiatives with potentially negative consequences

Environmental issues in agriculture

The cause of concern though is that an examination of the morphology and sedimentology of the lower reaches of the Beas River reveals evidence of repeated high magnitude torrents and floods in the form of boulder-streamed features that are diagnostic of very high magnitude flows. These flows are present in many of the first order channels throughout the area. Today many of the currently occupied farms and terraces that form the agricultural land base comprise debris flow and flood deposits, providing evidence of very high magnitude paraglacial erosion and deposition processes. A high–magnitude debris flow blocked the Solang River and caused flooding in Beas, as recently as August 2001. There are increasing environmental concerns due to conversion of forest lands to agricultural lands. Rivulets and streams erode the adjoining agricultural lands. On sloping lands runoff water, if unchecked, is causing shortage of groundwater sources. Application of chemical pesticides is polluting water and fresh harvests.

Environmental issues in tourism

Tourism is recognised as the second major industry in the Kullu district. The Kullu Valley's scenic qualities, geographic location, and distinct cultural attributes have made Manali a popular tourist destination in recent years. Manali, a town of approximately 4,000 inhabitants saw tourist arrivals increase from less than 40,000 in the 1970s to over 1.5 million per year in the early 1990s. Political strife in Jammu and Kashmir, and the upgradation of NH 21 has caused these impressive increases in the number of arrivals. The resulting boom in the development of hotels and related services is impressive. There are currently around 650 hotels and guesthouses in the Upper reaches of the Kullu Valley, mostly in Manali. The pressure of constant population growth is creating increasing stress on the ecology of the region.

Environmental issues in loss of biodiversity due to hydropower projects

The Kullu district, along with much of Himachal Pradesh, has vast potential for hydroelectric development. Steep, sloped valleys that rise above 4,500 meters result in fast moving glacial fed rivers and nallahs (streams). Over the past 10 years Kullu has seen a large amount of activities in the hydropower development sector. In recent years the demand for power in India has exceeded supply, especially so in the northern region. This has resulted in the rapid exploitation of the hydropower potential of Himachal Pradesh. The Beas River is currently dammed near the border between Kullu and Mandi Districts by the Pandoh dam. Several other major power development projects have started coming up in the district including the Beas Satluj Link involving a diversion of the Beas River, three stages of the Parbati project, which has 1,900 MW potential in total, three stages of the Larji project (1,200 MW in total), which involves a 6 km tunnel to an underground power plant, and, the 86 MW Malana project.

In addition to these larger projects, there are a number of micro-scale hydroelectricity projects ranging in size from 200 to 1,000 KW that are either under construction or have been proposed for the Kullu district. It is estimated that there are 319 small-scale hydroelectricity sites proposed for development in Himachal Pradesh.

Full consideration of the impacts of Himachal Pradesh's hydroelectric policies is, obviously, beyond the scope of this study. However, it is worthy of mention that centralised, large-scale power generation projects are causing a great loss of biodiversity in this region. A large number of hydropower projects have been established/initiated on the rivers of the state to generate electricity, and supply it to the northern states of India. Hydropower projects are one of the major income generating resources for the state, but they have a lot of attached cost. The diversion of water can impact stream flow, or even cause a river channel to dry out, degrading both aquatic and streamside habitats. Hydroelectric plants can also have an impact on water quality by lowering the amount of dissolved oxygen in the water. In the reservoir, sediments and nutrients can be trapped, and the lack of water flow can create a situation for undesirable growth, and the spread of algae and aquatic weeds.

The state of Himachal Pradesh covers a total geographical area of 55,673 km^2, of which 66.45% area is under forests including all forest categories. It has 59.3% area under protected forests, and 3.41% of the area is under Reserve Forests. The state supports 32 protected areas, and is well known for its rich biological and cultural diversity. The vegetation of the state mainly comprises of tropical, subtropical, temperate, subalpine and alpine types, and supports a large number of medicinal, wild edibles, rare and endangered wild relatives of crop plants, and native and endemic species. The forest zone is mainly dominated by *Quercus floribunda, Cedrus deodara, Pinus wallichiana, Picea smithiana, Abies pindrow, Quercus semecarpifolia, Aesculus indica, Acer acuminatum, Juglans regia* and *Betula utilis*. The forests and alpine meadows are major habitats for wildlife. The inhabitants are dependent on this rich biological diversity for medicine, food, fuel, fodder, construction material, agricultural tools, fibre, religious activities, and various other purposes including livestock grazing. Habitat degradation, over exploitation of the biological resources, construction of roads, hydropower projects, *etc*. have caused the rapid loss of biodiversity.

The Parbati Hydroelectric Project is the largest of all the projects in the Beas basin in Kullu. Apart from this project, all the proposed and under-construction mega, mini and micro projects in the Beas basin, pose a great threat to the biodiversity of the region. Study done in the Parbati H.E. Project Stage-III showed that 60% species in the high project impact areas are natives of the Himalaya, and five percent species are endemic to the Himalaya. This shows high conservation value of these species. So adequate measures are required to conserve these species before destroying their habitats. Major threats from these projects to the biodiversity of the region stem from the loss of habitats, extinction of some of the rare endangered species of plants as well as animals from the area, poor regeneration due to change in the climate of the area due construction of the projects, loss of congenial environment for the species to flourish in the area, richness of invaded species, loss of native species from the area, and landslides which in turn destroy habitats. The construction of tunnels may cause damage to rootstock of the tree species. Improper dumping of the waste is one of the biggest threats to biodiversity.

Occurrence of high value medicinal plants such as *Aconitum heterophyllum, Bergenia stracheyi, Dactylorhiza hatagirea, Picrorhiza kurrooa, Podophyllum hexandrum, Angelica glauca, Meconopsis aculeata, Taxus baccata* subsp. *wallichiana*, *etc*. indicates the high socio-economic and conservation values of the project catchments. Most affected are the local residents as the forests nearby will degenerate with the construction of the projects, and they will have to go far away for their daily needs such as fuel wood and fodder.

Inhabitants of seven villages in the Allain-Duhangan catchment - Prini, Hamta, Chhaleth, Sethan, Jagatsukh, Shuru and Bhanara - are mostly dependent on vegetation of the catchments for house building, fodder, fuel wood, medicine, edible/food *etc*. Evergreen broad leaved trees such as *Quercus semecarpifolia* and *Q. floribunda* are the chief sources of fodder, and *Pinus wallichiana*, *Cedrus deodara* and *Abies pindrow* are the sources of timber, and *Valeriana jatamansi, Viola biflora*, *Podophyllum hexandrum* and *Angelica glauca, etc.* are exploited for medicinal purposes. It is important to mention that local villagers in pursuit of easy money have also sold off their ancestral property (agricultural land) to the hydel projects. As a result, once the money made by the sale is exhausted, they have nowhere to turn to, and no work to do.

A total of 1352 trees (882 trees in Allain site and 470 in Duhangan site) are to be affected. Maximum number are of *Quercus semecarpifolia* (270) variety, followed by *Abies pindrow* (268 individuals) and *Quercus floribunda* (232 individuals). These tree species are being affected by the construction of tunnels, reservoir and roads. This is the number of only mature trees. With this felling there will be a great loss of the underlayers of shrubs and herbs in the area.

Silt and other material extracted from tunnels of power projects being executed in Kullu valley have also been thrown into River Beas. Similar will be the situation in Kol Dam Project being executed on river Sutlej near Bilaspur by NTPC. In this project too no provisions have been made for the disposal of silt and stones to be extracted from the tunnels. Continuous flow of silt to Bhakhra and Pong reservoirs has been reducing their lives.

Environment and the construction of cement plants

Other developmental activities in the district include setting up of cement plants. Himachal Pradesh is fast losing its forest cover. Kullu, Solan, Bilaspur and Shimla districts of state are the worst affected where hundreds of acres of land have gone barren because of reckless felling of trees by power projects and cement plants. Today flash floods, landslides and sinking of land has become quite common. Every year thousands of persons are being killed because of flash floods and landslides in the state. Besides, the state faces losses to the tune of thousands of crores of rupees because of flash floods and landslides in the state. Kullu is one of the worst hit districts.

It is surprising that the state government has failed to initiate action against the defaulting companies. In Kullu, Kangra and Shimla districts, private companies axed over five thousand threes without obtaining any permission from the state government. But the governmental agencies remained silent spectators, and initiated action only after the trees had been cut. Though the cement plants being set up in the state will give additional revenue to the state, these projects have become major environmental hazards. The recurring losses caused to the state's forest wealth by these projects cannot be compensated in any way. The companies executing these projects have failed to follow the norms fixed by the Apex Court and the Ministry of Environment and Forests at the Centre. There is no stress on new plantations.

The situation deteriorated to such an extent that the State Pollution Control Board has become non-existent for all practical purposes. Various companies executing these projects who are setting up cement plants do not even bother to reply to the notices issued by the Board. Increasing political interference has made the matter worse.

Impact of mining activities

The negative impact of mining has been felt with respect to land degradation, effect on flora and fauna, effect on air quality, noise pollution, and major impacts on the water regime. Perhaps the impact on the water regime is the most significant. Deeper

excavation on the surface or underground digging, can cause water table to sink locally, often drastically, resulting in the drying up of the wells and springs of the surrounding areas. In the hilly terrain, the process of excavating and landslides frequently exposed passages of the underground water, thus depriving water sources of their content. Exposure of fresh rocks due to mining initiates weathering which causes water pollution. Mining activities increase short term turbidity at the mining site from resuspention of sediment and oil spills from excavation machinery and transportation vehicles. Mining activities may therefore increase suspended solids and chemical contamination in the water that flows downstream. The impact can be drastic when water users downstream use the water for drinking.

The natural forests are being destroyed in the district at a rate faster than what nature or man can regenerate. The state has planted trees only on paper. Even the survival percentages of saplings have come down. In a number of divisions the survival percentage was recorded between 20 to 30 percent which is quite low.

4. Conclusion

Mountain ecosystems such as the Beas Basin constitute one of the most vulnerable and fragile ecosystems in the country. The rapid pace of development has altered the biophysical balance of the Kullu valley. As the large-scale projects in the state proceed, we stand witness to continued growth in Kullu's cities and towns, which have already experienced rapid urbanisation over the past thirty years. With increasing pressure of human population and livestock, the natural resources are under threat of depletion at a fast rate.

Results show that despite the rapid pace of development in general, and of hydropower development in particular, a critical element of the environmental approvals process, namely environmental assessment is in its nascent stages in this area of the Indian Himalayas. As one local individual suggested "there is a failed record of EIA in the mountains. Development of roads, dams *etc*. has followed a technocratic model that has failed the environment and the people".

Further, EIA cases that have been undertaken in the Kullu District revealed that there are few opportunities for public involvement within EIA in India as it is applied in the mountains. The information available was also found to be of most use to the proponent, difficult to access and not user friendly. Many process-related and operational constraints, such as inaccessibility of information, lack of familiarity with EIA, lack of financial assistance to participate, changing the hearing locations and the use of technical language all hinder serious public consideration of these projects. These are not new issues in developed and developing world EIA processes. The World Bank Environment Department (1993) has recognised that effective consultation in developing countries must include wide dissemination of information, two-way communication with a wide sampling of affected people, and the provision of feedback on results of consultation to avoid many of these constraints.

Contextual issues were also revealed as being constraints to effective public involvement. The lack of basic services in the area such as schools, hospitals, phones all underscore the people's desire for further economic development in the area. There was a general perception that the local people lacked the capacity to fully engage in EIA due to their lack of education and environmental awareness.

This last point was shown to be clearly not the case and perhaps offers the best opportunity to improve public involvement in the EIA process. Local people are environmentally aware and are concerned about what is happening to "their environment". The challenge is to engage them in the decision making process more effectively. The major implication of these conclusions is for policy makers in the mountain areas to start "thinking like a mountain."

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Legal aspects regarding water sharing, in relation to climate change concerns

Anil D. Mohile

1. Introduction

Conflicts are unavoidable, and, to some extent, desirable since they lead to more basic thinking, and to technical and philosophical developments. This is true about water conflicts as well. Most water conflicts are related to the sharing of available water resources amongst political units, sharing regionally within the same political unit, sharing amongst possible conflicting uses, and, sharing amongst individuals within the same use. Water conflicts also arise during planning of water resources development projects surrounding the submerged/ disturbed, and the benefitted areas, the distribution of threats or hazards (natural and/or anthropogenic), changes in river or groundwater development, effects on downstream livelihoods, changes in river course or groundwater development, effects on downstream aquatic ecology, upstream watershed developments, and their effects on established downstream uses. However, conflicts related to water sharing are the most volatile ones.

2. Ownership and rights over water

Most conflicts arise out of different ideas about 'ownership' of water. An upstream person/region/ state /nation takes a stand "nature has gifted me with precipitation on my land. It is my property and I can use it in any way. I have no obligation to let it flow downstream for someone else's use". This, in short, is the Harmone Doctrine once used by the USA against Mexico, and has been totally discredited by now. But, even today, politicians sometimes find it convenient to raise local passions, since, though fundamentally incorrect, it is based on a simple logic. The exact opposite is the doctrine of causing no harm to the downstream user by the upstream one. Another doctrine is based on prior rights according to which whoever uses the common resource first has the right.

When dealing with water rights, some differences from the rights attached to land have to be appreciated. Water including groundwater is a fluvial resource. It is not attached to land. Water is also a common pool resource. Water use at any place in a basin, either directly affects, or constraints, the use anywhere else in the basin. Hence, water use planning needs to be done for the basin, which is a unitary whole. But then, the question about the ownership of water remains unanswered. The author prefers the well-argued formulations of the Krishna Water Dispute Tribunal (1976). According to this formulation water is a negative commodity. It is a common pool resource; but, unlike a village common land which everyone can rightfully use, water can be used by no one, unless such a use is specifically authorised in the basin water distribution, and does not cause a significant harm. Since it is a negative commodity, water rights are usufruct. One has a temporary right to use the water, in her possession, as per the authorised plan. She has no right on the water both before it comes in her possession, and after she has left it without use.

In India, there is another problem associated with water rights. The states are very conscious in getting their rightful share in the basin waters. This is as it should be. But after obtaining such rights, they have failed on two fronts. They have failed to create transparent, quasi-judicial processes to distribute these rights regionally within the state, and amongst competing uses, within the region. This, in general, is solely left to the executive wing. The states have also not given rights to users in the form of legal entitlements. The users, in most states, continue to receive water as a traditional right, which the state can withdraw without a legal process, if it can afford to do so politically.

3. Ways of resolving water conflicts

As stated already, action anywhere in a basin affects actions all over. Hence, the whole basin becomes a natural unit for planning and operating water systems, as also for allocation. There are many mechanisms for allocating the water available in a basin; agreements are one of these.

Agreements

Agreements have been used extensively in the past for distributing waters of a basin. A CWC (Central Water Commission) publication in 1995 lists 82 such agreements, a majority of which were arrived at, by the parties on their own. While water discords receive wide publicity, these accords do not. Similarly, a large number of international treaties and agreements (ten out of the eleven listed by CWC) were reached by the concerned nations on their own.

Sometimes, the parties to a negotiation could be helped by the use of "good offices" of another agency, in which they may have trust. Some of such examples include the World Bank helping India and Pakistan in the finalisation of the "Indus Water Treaty, 1960". The Ministry of Water Resources and the Central Water Commission assisted the five states of U.P. Haryana, Rajathan, Himachal Pradesh and the National Capital Territory of Delhi in reaching the Memorandum of Understanding regarding the allocation of surface flow of Yamuna in 1994. The agreement with respect to Bhander Canal (1973) had CWC as a signatory. The agreement regarding Rajghat, 1973, was based on the Union Government playing a role. Sometimes agreements are also reached through mediation. This mode of settlement has a considerable scope, but unfortunately, it has not been used in India.

Arbitration

This mode of conflict resolution for addressing water conflicts has not been used in India, except for the Indus Water Treaty, where it is expressly provided for.

Adjudication

Adjudicated solutions form the last resort in solving water conflicts. Their main strength is that the judicial process is sure to resolve the conflict. Their main weaknesses are; i) the solution may not be politically acceptable, and although an enforceable solution is reached, ill-will may continue; ii) generally, the adjudicated solution may not include the possibility of optimum integrated river basin development; and, iii) it is a time consuming

process in spite of the recent amendments to the Interstate Water Dispute Act, 1956.

Awards under the Interstate Water Dispute Act were notified for Krishna, Godavari, and Narmada Rivers. For Cauvery, the final order was issued, but the further process of clarifications and notification seems to have been halted. Similar is the case for the Sutlej and Beas Tribunals. The Tungabhadra board was set up under the "Andhra State Act" (1953) while the Bhakra Beas Management Board was set up under the Punjab Reorganisation act.

4. Legal considerations for sharing waters of trans-boundary rivers

International rivers

There is no international law on water. The Helsinki Rules (1967) mention the following factors as consideration in water sharing: the geography of the basin, including in particular the extent of the drainage area in the territory of each basin state; the hydrology of the basin, including in particular the contribution of water by each basin state; the climate affecting the basin; past utilisation of the waters of the basin, including in particular existing utilisation; economic and social needs of each basin state; the population dependent on the waters of the basin in each basin state; the comparative costs of alternative means of satisfying the economic and social needs of each basin state; availability of other resources; avoidance of unnecessary waste in the utilisation of waters of the basin; practicability of compensation to one or more of the co-basin states as a means of adjusting conflicts among uses; and, the degree to which the needs of a basin state may be satisfied, without causing substantial injury to a co-basin state.

There was further thinking, and the Helsinki convention was prepared in the year 1992. This was further sought to be changed and adopted as a United Nations Convention. Work proceeded in this direction, and in 1997, the UN General Assembly adopted the Convention. The U.N. Convention, gives the following principles for water sharing: geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural

character; the social and economic needs of the watercourse states concerned; the population dependent on the watercourse in each watercourse state; the effects of the use(s) of the watercourses in one watercourse state on other watercourse state(s); existing and potential uses of the watercourse; conservation, protection, development and economy of use of the water resources of the watercourse, and the costs of measures taken to that effect; the availability of alternatives, of comparable value, to a particular planned or existing use.

The stress in the Convention is on equitable and reasonable utilisation and participation, obligation not to cause significant harm, general obligation to cooperate, regular exchange of data and information, protection and preservation of ecosystems, prevention, reduction and control of pollution, protection and preservation of the marine environment, and the prevention and mitigation of harmful conditions.

Between the Helsiki rules of 1967, and the UN Conventions of 1997, the stress on prevention of pollution, and protection and preservation of environments has increased. Also note that the UN convention talks about the "marine environments', which are beyond the "common terminus" of a basin into the ocean system, and therby expand the concept of the 'basin'.

The U.N. Convention has not yet been ratified by the requisite number of countries. When this is done, the convention would be binding. Even now, they are likely to act as an important policy document in any negotiated settlement.

Interstate rivers: the legal position in India

India is a union of states. According to the author, Articles 1, 2 and 3 of the Constitution of India, which give to the Union, the powers of admitting, creating or changing the boundaries of the states makes it abundantly clear that the Union makes the states, and not the other way around. The arrangements in India are peculiar and special: the states have wide powers; but the nation is not a federation.

The powers of the Union, with regard to water, are derived from article 246, and Entry 56 of the Union List:

"56. Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest."

The powers of the States are regulated by Article 246, and its entry 17 in the State List:

"17. Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of entry 56 of List I."

Thus, the powers of the states are subject to the use of the powers, by the Union legislature, in public interest. So far, the Union has passed the following legislations under Entry 56:

1. The River Boards Act, 1956 could not be used because of various difficulties.

2. The Brahmaputra Board Act, 1980 is a comparatively more practicable Act that gives the Board powers to deal with the whole basin, in regard to planning, investigation, execution, *etc*. However, the scope is limited to flood control, or multipurpose schemes having a flood control component.

3. The Betwa River Board Act, 1976 concerns itself only with the Rajghat interstate project.

In the absence of any acts by the Union legislature, except what is stated above, the states excersise very wide powers about water and its use. There are a few other Central acts. Water pollution and water environments, environmental impacts of water development, social and tribal concerns, *etc.*, are within the powers of the Union.

For water related disputes amongst the states, the constitution provides as under:

"262. (1) Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in, any inter-State river or river valley.

(2) Notwithstanding anything in this Constitution, Parliament may by law provide that neither the Supreme Court nor any other court shall exercise jurisdiction in respect of any such dispute or complaint as is referred to in Clause (1)"

Under this provision, the Parliament has enacted the "The Inter State Water Disute Act, 1956, and has amended it twice.

Under this act, various (Krishna 1, Krishna 2, Godavari, Narmada, Cauvery, Ravi Beas) water dispute Tribunals have been set up. This act, or the rules under the act, give no directions to the tribunal about the principles to be followed in water sharing. However, all the awards finalised so far have followed principles, somewhat similar to those in the Helsinki rules, and the recent awards have made at least token provisions for the aquatic environment, perhaps taking a cue from the UN conventions. All have followed the principle of equitable utilisation.

The Central Government, in the late 1990s, took an initiative in formulating a draft policy for sharing waters of interstate basins amongst basin states. The draft was discussed in the National Water Board, but the National Water Resources Council, headed by the Prime Minister, could not approve it. According to the author, following changes in the allocation process are required:

First, the international conventions, although important, are not fully applicable to the Indian states. After taking care of their interest, the basin states have a positive interest in the development of non-basin states and of the nation. Hence, all waters need not necessarily be allocated to the basin states, and, reservation for non-basin states need not be subject to agreement amongst the basin states. Second, states should have an obligation to maintain water quality, and the quality of water delivered (or let out into the sea), should be a part of the allocation. Third, the allocation process needs to recognise the essential unity of rainwater, river water, and groundwater, and allocate all. Fourth, there should be a much larger allocation towards aquatic ecosystems. Fifth, allocation for national waterways needs to be made. Sixth, the tribunal should not go by the past natural flows alone, but needs to consider likely future changes. Seventh, apart from the states, the Union needs to be an active participant in

the tribunal process, to take care of these matters, which are the concerns of the Union.

5. Drivers for change in the water use scenario

Population, except in a few southern states, is growing fast, and hence water demands, are increasing. For each kilogram of additional cereal, about 5000 litres of water is required. With economic prosperity, diets are changing. More fruits, milk, eggs, poultry and meat are being consumed. Although, currently, agricultural waste constitutes an important component of animal food, this will change. For each kilogram of animal food, about eight kilograms of feed will be required. India is also urbanising very fast. The domestic water needs, and sewage treatment needs are more for cities with flush toilets. Similarly, to bridge the urban-rural gap, rural areas would also have to be provided with flush toilets, piped sewerage, and sewage treatment. Industrial demands, both consumptive and non-consumptive, are bound to increase very fast.

On the one hand, quality of water in our rivers and underground aquifers is deteriorating, and on the other hand, public consciousness about this is increasing. However, diluting bad water with good water, to obtain an acceptable quality, is almost impossible. Stopping pollution is the only way out. Natural ecological systems use substantial quantities of water. The use of rains by the forest and grassland ecosystems is important, but is often ignored. What comes more into public attention is the water required by aquatic ecosystems, in rivers, estuarine reaches, wetlands, and flood plains. Any water use for agriculture, industries or drinking is going to affect the ecosystem. A trade-off is essential, and tolerable disturbances in the natural regime, even while maintaining its essential features, are necessary.

6. Concerns related to climate change

In the next section, we discuss the likely hydrology-related changes, which climate change may cause. In general, rainfall in India may increase. However, precipitation variability may increase as well, as might floods and droughts. Rise in temperature can change the potential evapo-transpiration of

crops. On the other hand, for some crops, this will result in better yields. Similarly, if short-period rain intensities increase, then soil erosion, and consequently the patterns of river sedimentation, river shifting, and meandering may change.

Climate in a narrow sense is defined as "average weather", or more rigorously, as the statistical description in terms of mean and variability of relevant quantities of weather parameters over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by WMO. These parameters are most often surface variables such as temperature, precipitation and wind. Climate change, in IPCC usage, refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that of UNFCCC which defines climate change as, "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Studies related to the impacts of climate change on various components of the hydrological cycle may be classified broadly into two categories: (i) studies using GCM/RCMs directly to predict impact of climate change scenarios, and, (ii) studies using hydrological models with assumed plausible hypothetical climatic inputs.

However, the predictions of the scientists, in regard to changes in the hydrologic cycle, resulting from larger greenhouse gas emissions, differ. This can be attributed, amongst other facors, to the Global Circulation Model (GCM) used, and in adjusting the GCM results to a smaller RCM (Regional Circulation Model). The scientists of NIH, Roorkee have a made a literature survey to examine the findings of the various important studies in regards to climate change, and its likely effect on the water resources of India. Although the findings of each study are different, the general consensus in these studies seems to be as follows.

Temperatures may increase throughout India and particularly in the Northwest and the Southeast. As a consequence, there may be an increase in potential evapotranspiration. As a further consequence, there may be more glacial melt for some

years, recession of glaciers, and less melt later on. Summer monsoon precipitation may increase throughout, but this would be more marked in the Northeast. There may not be any increases, or there may be a decrease in winter precipitation. Rainfall variability may increase. The date of onset of summer monsoon may become more variable. More extreme rainfall events are also projected.

Knowing the change: data collection

Hydrologic regime changes due to climate change is a distinct possibility. To understand this, we require to mount a data collection programme, which is detailed in the National Water Mission report. To state in a few words, we need additional data about: more data in the tidal and estuarine river reaches; more data in regions of seasonal snow and glaciated areas; larger and denser network of evaporimeters; and, more data about river morphology, and shifts in river courses.

Adjusting to the change: policy initiatives

The policy changes necessary to enable us to cope up with climate change would include: use of groundwater space as storage, through enhanced fluctuations; increasing storages in water use systems; more efficient use of vadose zone moisture storage; repeated use of storage during wet season through on-farm ponds *etc.*; irrigation with dependable Kharif and small non-dependable Rabi crops; increasing storages and carryover storages; changes in the planning criteria of water projects, considering their sensitivity to climate change; increasing water-use efficiency; implementing policies for reduction in the absolute population deriving livelihoods from land; encouraging water transfers from surplus to deficit areas; changing cropping pattern towards low water-use crops; adopting integrated farming systems; and, encouraging non-agricultural developments of the type where not much water is required.

Equipping towards changes in planning: new knowledge acquisition

We need to realise that we are not up-to-date with world class technology to be able to model the effects of climate change.

A few national institutes have some capability, but, this is not spread all over. Even the capable institutions, because of their monopoly, may not be able to deliver consistently. Urgent capacity-building is necessary in creating decision support systems in canal irrigation; for automation in canal irrigation including soil moisture monitoring; for facilitating participatory management by water users for improved efficiency; and for facilitating action research involving water users. Capacity-building of institutions is also required for improving irrigation distribution with proportionate regulators; for conducting carrying capacity studies considering land, water and livelihoods; for understanding water use efficiencies; for computing basin efficiency; and for creating better models for computing snow and glacial melt. We also need to improve technology for sediment budgeting through universal soil loss type method. There is a need to evolve better methods for improved hydrologic basin water assessments under changing land use and climate. We also need to build robust coupling terrain models, flood propagation models, and erosion/ sediment transport models.

Training of personnel

A massive programme for training of personnel, in governmental and semi-governmental institutions, academic institutions, private consultants, *etc*. needs to be undertaken with regard to knowledge acquisition.

7. Can climate change be used for reworking water sharing?

Climate change, in India, as we have discussed, can increase precipitation, its variability, water demands, *etc*. The net effect is not clear. Similarly, floods of the same probability may increase, and flood embankments may have to be raised. River course shifting, and river bed rise may become more common. More tidal embankments may become necessary. The water allocations made and already settled water disputes may come under stress in such circumstances. On the other hand, an unsatisfied party may use the perceived or proven hydrological change for reopening a dispute.

Reworking the agreements

As already stated, states have bound themselves in many water related agreements. It is difficult to understand the legal context of these. These are not treaties, since states are not sovereign. The powers about (international) treaties or agreements are vested only with the Union. The Constitution of India does not provide for inter-state agreements for water. So, these may have to be treated as contracts.

According to the 'The Indian Contracts Act', contracts, when entered, become a binding personal law, the breach of which can attract compensation. However, in certain circumstances, the contracts can become voidable. The act seems to have two provisions under which an affected state can plead for the contract having become voidable under hydrological transformations related to climate change. These two provisions are:

"32. Enforcement of contracts contingent on an event happening.-

Contingent contracts to do or not to do anything if an uncertain future event happens cannot be enforced by law unless and until that event has happened. If the event becomes impossible, such contracts become void." However, it would be difficult to argue that water related contracts are contingent contracts. Also:

"56. Agreement to do impossible act. An agreement to do an act impossible in itself is void. Contract to do act afterwards becoming impossible or unlawful.-A contract to do an act which, after the contract is made, becomes impossible, or, by reason of some event which the Promisor could not prevent, unlawful, becomes void when the act becomes impossible or unlawful.

"2*Compensation for loss through non-performance of act known to be impossible or unlawful.-Where one person has promised to do something which he knew, or, with reasonable diligence, might have known, and which the promisee did not know, to be impossible or unlawful, such promisor must make

compensation to such promisee for any loss which such promisee sustains through the non-performance of the promise".

Illustrations

(a) A agrees with B to discover treasure by magic. The agreement is void,

(b) A and B contract to marry each other. Before the time fixed for the marriage, A goes mad. The contract becomes void.

(c) A contracts to marry B, being already married to C, and being forbidden by the law to which he is subject to practise polygamy, A must make compensation to B for the loss caused to her by the non-performance of his promise.

(d) A contracts to take in cargo for B at a foreign port. A's Government afterwards declares war against the country in which the port is situated. The contract becomes void when war is declared.

(e) A contracts to act at a theatre for six months in consideration of a sum paid in advance by B. On several occasions A is too ill to act. The contract to act on those occasions becomes void"

Thus, a state might possibly plead that hydrological transformations related to climate change were unknown to him when the agreement was signed, and now the act has become impossible.

The tribunal awards

There is nothing in the Interstate Water Dispute Act which allows the reopening of a settled and gazetted award. Some awards, however, provide for a review after a specified date.

Treaties, contracts or agreements are an important part of a civilised society, and promises should be kept. However, if only it could be effectively demonstrated that only one or some parties to the treaty, contract or agreement has suffered disproportionately due to hydrological transformations related

to climate change, there could be a strong case for renegotiations. For example, in the 1976 Krishna award, in general, all utilisable water is allocated to the three states, but the downstream state is at liberty to use the residual waters. Now, if the amount of utilisable water increases due to climate change, the downstream state, would have an advantage; if it decreases, the downstream state would have a disadvantage. If these changes are large, there would be a logic for reopening the case.

8. Concluding remarks

We have gone over the whole gamut of issues involved in the legal aspects of water sharing, under climate change, without reaching any firm conclusions. Coping with possible hydrological transformations attributable to climate change would require more data, policy adjustments, better technologies, more trained personnel, *etc*. If efforts are started in time, this can be achieved. However, climate change is one amongst the many drivers in our dynamic situation. Also, we do not really know all the relevant facets of likely climate change. If climate change does occur, our water plans, as well as the water allocation provisions would come under stress. Ways of possible reopening of the arrangements are discussed, while discouraging such reopening, unless completely unavoidable.

Reflections on the politics of conflicts over Hirakud waters

Tapan Padhi

1. Battle turf Hirakud

Hirakud dam over River Mahanadi, the first major dam to be commissioned after Independence was referred to as the Temple of Modern India by the then Prime Minister Jawaharlal Nehru while inaugurating the dam on 13th of January, 1957. Nearly sixty years down the line, this temple of modern India has become a battle turf between the farmers in its command area and the state. Farmers have been demanding that the water of Hirakud is being diverted to industries at the cost of agriculture, while the state holds that only a small percentage of the water in the dam has been allocated to industries, and enough has been left for agriculture. With every passing month, the resistance by local farmers is gaining momentum, the high point being a human chain of 20000 strong men and women on the banks of Mahanadi at Hirakud.

The Hirakud reservoir has been riddled with conflicts from the day the foundation stone was laid. There was stiff resistance by the villagers in the submergence area. More than twenty two thousand families (22144 families being the official figure) were displaced, out of whom many had to evacuate in the dead of night, only saving themselves from the armed police. Of the officially recognised displaced families, 3540 are yet to be compensated even fifty years after their displacement, and have become a black blotch on the history of dam construction in India.

Hirakud was conceived as a multipurpose dam catering to flood control in the deltaic areas of river Mahanadi, irrigating agriculture land in the mid reaches of the river, and contributing to power generation to boost the industrialisation of Odisha. The seeds of conflict were hidden in this combination of purposes as power generation and irrigation require filling up of the reservoir up to the brink to have as much water as possible,

and the flood control function require the reservoir to be empty to accommodate water from flashfloods in Chattishgarh. This conflict has given rise to a number of flash points with coastal Odisha people alleging that Hirakud does not play an effective role in flood control, and farmers of Sambalpur and Bargarh complaining that they do not have enough water for their crops. Water demand from the new and upcoming industries has aggravated the conflict. And there are other factors such as higher than projected siltation of the reservoir, water resources development in the upper reaches of the dam in Chhattishgarh, and the most recent climatic uncertainties that have reduced the inflow into Hirakud. And the proposal for linking Mahanadi with Godavari, if realised, will complicate the contestations around the water of Hirakud dam further, as this linking proposal also envisages that the tail-race water of Hirakud reservoir also will be fed to the interlinking canal.

2. River Mahanadi

Mahanadi is the major river of Odisha, and the sixth largest river in India. It originates from the Amarakantak hills of the Baster plateau near Pharasiya in Raipur district of Madhya Pradesh. Mahanadi drains large areas of Chhatisgarh, Madhya Pradesh, Odisha, and comparatively smaller areas of the states of Jharkhand and Maharashtra. This makes the river basin an interstate system. It is about 851 kilometers long, out of which, it traverses 494 kms through Odisha. Odisha accounts for 65,628 square kilometers (46.5%) out its total catchment of over 1, 41,134 sq km. Mahanadi drains 42.15% of the total geographical area (1,55,707 sq. km) of Odisha.

Spread of basin area in different states

State	Total drainage area in sq. km	Percentage of the basin
Chattishgarh and MP	75,136	53.24
Odisha	65,628	46.5
Maharashtra	238	0.17
Jharkhand	132	0.09

Source: Report on Basin Planning of Mahanadi Basin, Second Spiral, DoWR, GoO

River Mahanadi has 14 tributaries out of which three are in Odisha namely Ib, Ong, and Tel. Ib drains into the Hirakud

reservoir, and the other two, Ong and Tel, join the mainstream of the river on its right bank downstream of the Hirakud Reservoir. The River Seonath having a length of about 383 kilometers on the left bank is the longest among the tributaries, and it alone constitutes (30,761 sq.km), 21.7% of the total drainage area of River Mahanadi. The total population living in the Mahanadi River Basin is 1, 62, 02, 132. The river forms a major portion of the Odisha coast, and the delta starts from Mundali in the Cuttack district. The Mahanadi delta is highly flood-prone.

3. The Hirakud dam

The dam is located at latitude 21.31 degrees North and longitude 83.52 degrees East across River Mahanadi, about 15 kilometers upstream of Sambalpur town at a place called Hirakud that gives the dam its name. The dam is about 4.8 kilometers long, bordered by earthen dykes on its left as well as right sides. Along with the dykes, the length of the dam totals to 25.8 kilometers. The reservoir submerged 1, 23,303 acres of cultivable land. The live storage capacity of the Hirakud reservoir at Full Reservoir Level (FRL) is 3.90 Million Acre Feet (MAF), which is the maximum volume of water available for use at the end of the monsoons. The reservoir has two power houses at Burla and Chipilima with installed capacities of 259.5 MW and 72 MW respectively, totaling 331.5 MW.

The groundwork for the Hirakud reservoir started after the devastating floods of 1937 in coastal Odisha. Construction of a storage reservoir was suggested by Sir M. Visveswararya to tackle flood in the delta. In 1945, under the chairmanship of Dr. B. R. Ambedkar, it was decided to investigate the potential benefits of controlling the Mahanadi for multi-purpose use. The Central Waterways, Irrigation and Navigation Commission took up the work. The foundation stone for the Hirakud reservoir was laid by Sir Hawthorne Lewis, the then Governor of Odisha in the year 1946. Pandit Jawaharlal Nehru laid the first batch of concrete on 12th of April, 1948. The construction was completed in 1953, and was formally inaugurated by Prime Minister Jawaharlal Nehru on 13th of January, 1957. The total cost of the project was Rs. 100.02 crores (in 1957). Power generation along with use of the water of the reservoir for agricultural purposes started in 1956 achieving full potential only in 1966.

Mahanadi reservoir regulates 83,400 square kilometers of the Mahanadi basin. The project provides 1,556,00 ha of kharif and 1,084 km² of rabi irrigation in the districts of Sambalpur, Bargarh, Bolangir, and Subarnpur. The water released by the power house irrigates another 436, 000 ha of CCA in Mahanadi delta. The dam has the potential to generate up to 307.5 MW of electrical power through its two power houses at Burla (on the dam's right bank) and Chiplima (22 km downstream from the dam). In addition, the project provides flood protection to 9500 km² of delta area in the districts of Cuttack and Puri.

4. Industrialisation in Odisha

Odisha is endowed with vast reserves of minerals such as coal, iron, chrome, bauxite, limestone *etc*. But despite this, the state has had very low levels of industrialisation. From the 1990s onwards groundwork for massive industrialisation was done after the promulgation of the Industrial Policies of 1994, 2001, and 2007. As the state government rolled out the red carpet to industrial houses, and went on a MoU signing spree, many industries have come up or are in the process of being set up. Thermal power plants, aluminum refineries and smelters, iron and steel plants are among the major industries that are coming up.

The industrialisation plan of the Government of Odisha has not been strongly supported with infrastructure development. While the state promises to provide water to these industries, it has not been very successful in doing the same effectively. This has led to a situation where industrial houses have started fending for themselves. Many of the industries, mostly the small ones, have gone for groundwater exploitation to run the steel plants and sponze iron plants. The Government of Odisha has, by virtue of a notification, allowed industrial houses to develop their own reservoirs, conveyance systems *etc*. to get water at their own cost. The money spent by these houses will be adjusted against the concessional water tariff till the whole spending is offset. As water shortage has been a major problem for industrialisation in Odisha, most of the major as well as small industries are flocking to set up plants around the existing irrigation projects or reservoirs. The government is also expediting construction of new dams/ reservoirs keeping the interests of the industries in mind. The Suktel project in

Bolangir, and the Ib dam in Jharsuguda are a few of the projects to be noted in this context.

5. Industrialisation around Hirakud

The Hirakud reservoir is surrounded by a mineral-rich region. The Ib valley has one of the largest coal deposits in Asia, and the coal mines are in close proximity of the reservoir. Major metallic deposits of chromite, iron ore *etc*. are also situated near the reservoir. Soon after the reservoir came into existence, major industries came up in the vicinity of the reservoir. The Indal Aluminium plant at Hirakud by the Birla group, and Tata refractories at Belpahar by the TATA group, *etc.* have come up along the bank of the reservoir. The Brajarajnagar and Belpahar region has a large number of coal mines as well.

Industrialisation around the Hirakud reservoir accelerated during the 1990s. With a slew of new policies, and major road development activities taking place with a World Bank loan, industrialisation started taking place at a faster pace. Jharsuguda has developed as a major industrial cluster where two mega aluminum smelters, one thermal power plant, a mega power station by Reliance Industries, and a couple of dozens of steel and iron industries have come up. Sponze and iron plants dot the landscape all around the reservoir.

6. Conflict over the water of Hirakud

Irrigation was one of the major reasons for which the Hirakud dam was constructed. In the initial projection, direct irrigation from this reservoir was supposed to be 448,000 acres in the Kharif and 224,000 acres in the Rabi seasons, totaling to annual irrigation of 6,72,000 acres. Besides this, water released after power generation irrigates 6, 20,200 acres in the Khariff season and 2,84,100 acres in the Rabi season in the delta irrigation system Stage – II in the lower Mahanadi basin. But that projection of irrigation potential was soon revised (reduced) to 3, 80,000 acres in the Kharif season, and 1, 90,000 acres in the Rabi season. Apart from this, the farmers in the Bhatli area near Padampur were promised regarding the irrigation of 50000 acres of land by lifting the water from the Bargarh command. That promise is yet to be fulfilled.

From the initial years Hirakud has failed to deliver. The irrigation that was projected could not be met; this led to revision of the Certified Command Area for the Hirakud reservoir. There was an overall reduction of 15.17% of the command area.

7. Projected and revised command area of the Hirakud reservoir

Added to this was the problem of the tail-enders. Sason canal on the left hand side of the reservoir irrigates parts of the Sambalpur and Jharsuguda districts on the left side of the Mahanadi River. It had an original ayacut (demarcated irrigated area) of 60,464 acres that has since shrunk to 42,500 acres even after the just-concluded renovation and modernisation of Sason canal, and the formation of Pani Panchayats (Water Users' Associations).

(Units in lakh acres)

Crop	Initial Projection	Revised Irrigation	Reduction in coverage
Kharif	4.48	3.8	15.17%
Rabi	2.24	1.9	15.17%
Total	6.72	5.7	15.17%

Source: Report of Er. Sudhakar Patri, Chief Engineer, MoWR, Govt. of Odisha

A study conducted by 'Development Support Centre, Ahmedabad' titled 'Tail Enders and Other Deprived in the Canal Water Distribution', for the Planning Commission in the year 2003 found that 80 percent of the tail area in the Hirakud command system did not get water for irrigation. Head-reach farmers irrigated 100 percent of their land. Middle-reach farmers irrigated 35 percent of their land. Tail-end farmers could irrigate only 18 percent of their designated land. In the current protests over Hirakud, all these three categories of users are participating. Even farmers cultivating close to the dam area say that they do not get enough water. While the head-reach farmers feel threatened by the diversion of water to industries, the other two categories face acute water scarcity that threatens their farming activities.

Reduction of the area actually irrigated in comparison with the area certified or designed for irrigation is nothing new in the case of flow irrigation systems. This has happened in

most irrigation projects. But what has triggered unrest among farmers in the case of Hirakud is the supply of the scarce waters of the reservoir to the industries, and their apprehension that this diversion of water to the industries has been at the cost of agriculture.

A look at the water allocation of Hirakud reservoir explains that statistically there should not be any conflict between agriculture and industry as there is just enough water for both. This was estimated by the Expert Committee set up by the Department of Water Resources after conflicts between agriculture and industry started gaining momentum. The Hirakud reservoir has a live storage capacity of 3.910 Million Acre feet (MAF). Irrigation requirement from November to June is estimated at 1.300 MAF. Since industrial requirements have been prioritised above power generation, they will require 0.391 MAF, and there will be normal evaporation loss of 0.391 MAF. With 2.041 MAF water utilised this way the reservoir will be left with only 1.869 MAF for power generation and water supply to local urban bodies such as Sambalpur, Burla, and Hirakud.

Apprehensions have been expressed that power generation from Hirakud dam could be affected to some extent during the rainfall deficit years. Organisations such as the Hirakhand Nagarika Parishad, the Odisha Krushak Suraksha Samiti and the agitating farmers of the area have expressed apprehensions that, once industries start drawing water from the reservoir, they will claim first priority over water use from the reservoir. On a different note, with industries or no industries there have been instances where irrigation has suffered due to less availability of water from the reservoir in the years 1966 and 1979 as these were drought years. And for the tail-enders every year is a drought year. The changing priorities of water allocation from the reservoirs and the surreptious manner in which the allocations are made have made farmers apprehensive.

8. Recent developments in water allocation

There was no provision in the original Hirakud reservoir policy to provide water to industrial units. By virtue of an order in 1990, 0.350 MAF water has been allocated for industrial use. Presently, water for industrial purpose is being provided to five industries

totaling 0.022 MAF/year. Water Policies of Odisha have re-set priorities of water allocation from reservoirs. The state's water policies have prioritised drinking water supply over supplies for irrigation. Power generation and use for industrial purposes are next in the order of priority as per the State Water Policy. Industrial use which was not in the priority list earlier has now found place there.

Given such a situation, farmers and other groups apprehend that in instances of further water stress in the Hirakud reservoir, industry will definitely get priority over other users. The state government will not allow industries to be shut down due to lack of water, and irrigation will suffer. It is not exactly the present use or allocation rather the trend of increased allocation and withdrawal from the reservoir that has sent the shock waves. A comparison between water allocation before April 1997 and after this period is indicative of the things to come.

Industrial water supply from the Hirakud reservoir

Period	From Hirakud reservoir	From All other sources in the state	Total
Pre-April, 1997	71,252	4,68,350	5,39,602
Post-April, 1997	4,33,179.2	9,44,222.4	13,77,401.6
Overall	504431.2	14,12,572.4	19,17,003.6

Source: Government's reply in the Assembly on 20.02.2006

Another factor that has been worrying the civil society and farmers is the way the whole issue of water allocation to the industries has been handled. Instead of the state government making arrangements to provide water to the industries, it is the industrial houses who are doing it themselves. Other than a perfunctory permission, there is hardly anything that the state government and its agencies do. So, the industrial houses have been taking water from the mouth of the main canals, and have been debarring the farmers of their share of water as a result of the reduced flow.

When Hindalco, an aluminum company, started laying pipes for its second water lift-off plant from the reservoir, a massive protest from the farmers followed, and the work had to

be stopped. Farmers say there is already a reduction in irrigation from the reservoir. But the real clincher is the case where Bhusan Steel Plant built a two km long kuchha road up to the reservoir to access its water offtake point. Interestingly, this is the same area where Vedanta plans to set up a water lift-off facility. The company's contractor started laying the pipes, and was forcibly stopped by farmers' groups. The contractor did not have any permission from the dam authorities, even though the area is a highly restricted point. The dam authorities and the district authorities said they were ignorant about it. This underlines that the 'Authorities' do not have much authority in the matter of water withdrawal from the dam.

9. Conflict between agriculture and industry over water in Hirakud

With the state government's new development policies focusing on industrialisation, the reservoir started supplying water to industrial plants pumping it from the reservoir. In 2006, the state government signed MoUs with 17 companies to provide them water from the reservoir. Meanwhile 50 years after the dam's construction, many downstream areas had yet to receive irrigation water, and tension had built up between reservoir authorities on the one hand, and the local government and farmers' associations on the other hand surrounding water releases from the dam.

The apprehension of the farmers, further fortified with the indifference of the authorities has led to a series of protests. In June 2006, 25,000 farmers fearing that diversion of water could deprive more than 20,000 hectares of land of irrigation water, formed an 18 km long human chain near Sambalpur to protest the provision of water to industries. Five months later, in the month of November, 2007, 30,000 farmers gathered at the reservoir to protest. This large turnout surprised even the protest organisers, and demonstrated the desperation of farmers over their water supply. Under pressure from the opposition parties, Odisha's Chief Minister assured farmers' representatives that not a single drop of water from the farmers' share would be diverted to industries, and announced a 20 billion rupees package for canal repair work in the Hirakud command area.

10. The key actors

At present rates of water usage, it seems that there is enough water for both agriculture and the industries. It is the trend of increased allocation of water to the industries from the existing irrigation systems and the present stress on Hirakud that is worrying the farmers' bodies. The government is content with the declaration that not a single drop of water will be diverted for industrial purpose. In this conflict one can see three key actors:

Farmers' organisations - Pashchima Odisha Krushak Mahasangha: Odisha Krushak Mahasangha, and different bodies of the Pani Panchayats in the Hirakud command area have been at the forefront of the struggle of farmers and peasants surrounding the water of Hirakud. They have articulated the position that the problem of water scarcity in the Hirakud command area is primarily due to the industries. It may be a matter of convenience or a strategy for them to not to look at the fundamental roots of water crisis in the region.

The state government and the 'Department of Water Resources': These are the agencies who are primarily responsible for policy making and water allocation. They have maintained the stance that all is well, there is no water crisis in the command area, and that there is water for all. Rather than resolving the conflict, the state government and the water resources department have been more worried about the fate of industrialisation in the Mahanadi basin. These players, in a way, are being seen as the representatives of the industrial houses. With the recent developments, it does not seem that water allocation is really under the command of the 'authorities'.

Industries: The industrial houses, after getting the permission for setting up the industries, and not being provided with water to run these, are left to fend for themselves and in the process have been inflaming public sentiment.

There are a few concerns of a more fundamental nature that need to be looked into while trying to address this conflict.

11. Key areas of concerns

Limitations of the technology: Farmers in the command areas of irrigation projects such as Hirakud generally complain of lack of water. Tail-enders suffer. Basing on the farmers' complaints, the Chief Minister of Odisha had instructed the Department of Revenue to reassess the actual area of land irrigated. Even the revenue department and the water resources department claim different figures for the area under irrigation. And this is happening even in the absence of usurpation of water by the industries. Water use efficiency of irrigation systems in the country is rated only at 35% in gravity irrigation. One is tempted to note that the cropping pattern advised at the design stage is hardly followed, and most of the land in the irrigated command areas are cultivated with water-intensive crops such as rice. The conflict of Hirakud waters also needs to be looked into in this light.

Allocation and the actual land irrigated: In this conflict, the debate has revolved mostly around water allocation from the reservoir. But, in an ideal situation, even if all the water of Hirakud is allocated, it does not ensure that the water reaches the agricultural fields. But non-irrigated land has not been at the core of the debate. This suits the government as it can get away with the statistics of allocation. And the farmers' bodies also find it an easier option.

Farmers' protest is based on apprehensions: The farmers' organisations, the civil society and the state have not tried to seriously answer the question as to whether the protests by the farmers is based on apprehensions only or there is some substance to it. This has been a good rallying point for the farmers, and pitting the industries as the enemy has been effective, but this does not spell out the real contours of the conflict and the fundamental issues involved.

Command area management: Command area management has been a real issue. Efficient use of water, providing water to the tail-end of the canal, checking seepage, designing canal outlets, ensuring the prescribed cropping pattern *etc*. have not been done very effectively. And these are the factors that contribute to this conflict, and, are perhaps its root cause.

Water supply to different industrial projects from the Hirakud reservoir

Sl No	Name Of the Industry	Location	Quantity of water allocated MGD	Sources
1	HINDAL CO (Aditya Aluminum)	Laphang Sambalpur	28.814	Hirakud reservoir
2	S.M.C Power Generation Ltd)	Hirma Jharsuguda	1.338	Hirakud reservoir
3	Shyam D.R.I power ltd	Rengali	6.01	Hirakud reservoir
4	Rathi Steel and power Ltd	Potapalli Jharsuguda	5.369	Hirakud reservoir
5	S.P.S Sponge Iron Ltd	Barmel Jharsuguda	5.369	Hirakud reservoir
6	Bhusan Ltd	Lapanga Jharsuguda	54.464	Hirakud reservoir
7	INDAL	Hirakud	10.933	Hirakud reservoir
8	Action Ispat and power Ltd	Markuta Jharsuguda	0.826	Hirakud reservoir
9	Viraj Steel and Energy Ltd	Rengali	1.983	Hirakud reservoir
10	OPGC	Banharpali, Jharsuguda	6.75	Hirakud reservoir
11	BIT, MCL, Bandhabahal	Bandhabahal, Jharsuguda	2.03	Hirakud reservoir
12	Orient Paper Mill	Brajrajnagar	1.01	Hirakud reservoir
13	SE Rly	Jharsuguda	1.35	Hirakud reservoir
14	INDAL	Hirakud	10.92	Hirakud reservoir
15	NTPC	Dharalipali, Sundergarh	87.43	Hirakud reservoir

Source: Assembly Question Answer: 13.11.2006

Politics of development: The Government of Odisha in its over-enthusiasm to woo the industries has been very complacent with regard to the real issues of water conflict in the Hirakud command area. When 90% of the population is dependent on agriculture, can the government afford to ignore the problem of irrigation?

Industry's image as the villain: Is industry the only villain? Even if the industries do not take water, and Chhattishgarh releases more water, the issue of water scarcity for agriculture will be far from over. This, along with climatic uncertainties, heavy siltation *etc*. needs to be considered to understand the present conflict in Hirakud.

To understand the real contours of the conflict over Hirakud water between agriculture and industries there is a need to have a fresh and objective look at the conflict of Hirakud by dealing with the concerns discussed above.

Self help groups: a medium of water conflict resolution

Hippu Salk Kristle Nathan and Jayashree V

1. Introduction

Nature of the unfolding water crisis in India

Water is a fundamental resource. It is synonymous with life for its direct bearing on human health. Drinking water in sufficient quantity and quality is one of the most basic human needs and it is a human right (SDC 2005). Supply of clean, adequate, affordable water is the most crucial infrastructural service, which is indicative of quality of life. Among all renewable resources, fresh water is the most important as it is difficult to purify, expensive to transport, and impossible to substitute (Mehta 2012). Water is an important and essential input for food production, industry, human consumption, and for the overall sustenance of life. In the poverty and calorie literature, access to safe drinking water is considered as an important determinant of nutrition as it improves the epidemiological environment and increases the capacity of people to retain calories (Deaton and Dreze 2009).

There is widespread recognition that the world is facing a growing water crisis, affecting the well-being of millions of the poorest people (United Nations 2005). India is not an exception to this. There has been a question mark on the quantity and quality of water available in India. India houses more than 17% of the world's population, yet has only 4% share of the world's water resources (GoI 2012). The total water resources availability in the country has remained constant, but the per capita availability of water has been steadily declining since 1951 due to population growth (Planning Commission 2007). Per capita water availability reduced from 5177 m^3 in 1951 to 1820 m^3 in 2001 (CAEP-TERI 2011). Per capita water availability is projected to further decrease to 1341 m^3 in 2025 and 1140 m^3 by 2050. The decline in water availability has converted water from a 'free' or abundant good to a 'scarce' resource. Even after

constructing 4,525 large and small dams, the per capita storage in the country is 213 m^3 as against 6103 m^3 in Russia, 4733 m^3 in Australia, 1964 m^3 in USA and 1111 m^3 of China (Planning Commission 2007).

The rapid development of groundwater and inexorable rise in the number of private tube-wells, at a rate of about a million each year, have made extraction exceed recharge in 15% of the groundwater blocks. At the current rate this figure will rise to 60% in the next 25 years (World Bank 2008; CAEP-TERI 2011). Some of the prominent underlining causes of groundwater crisis are, change of cropping pattern from rain-fed crops to water-intensive crops, increase in budgetary subsidies to agriculture, decline in public investments in agriculture, and inadequate laws governing groundwater extraction (CAEP-TERI 2011).

Declining water availability is not the whole of India's water story. Water quality in lakes and rivers is polluted on account of untreated or partially treated sewage from the cities (Planning Commission 2007). Also, geogenic and anthropogenic activities have led to chemical contamination of groundwater in many places with one in every eight habitations at risk (CAEP-TERI 2011).

Water conflict and its gender connection

The water situation in the country has also aggravated the water conflict situation. Within the next 20 years freshwater will become the most important strategic resource. Its control will be a source of power, and the key to economic development. It will be one of the root causes of socio-political stress (DESA 2005). In a way, water has become the most commercial product of the 21st century, what water is to the 21st century, oil was to the 20th century (NCW 2005). As per the Planning Commission (2007), water conflicts in India are on the rise. Apart from the traditional conflicts about water rights between upper and lower riparians in interstate rivers, conflicts about quality of water, people's right for rain water harvesting in a watershed against downstream users, industrial use of groundwater and its impact on water tables, and conflicts between urban and rural users have emerged.

Because women and children are usually the most affected persons by conflicts, they would clearly be the main victims of the resulting poverty often linked with the lack of access to fresh water (Aureli and Brelet 2004). The water crisis in India due to dearth of water quantity and quality has led to an adverse standard of life, particularly for women. Women and girls in rural areas are often obliged to walk distances of about 2.5 kilometres to reach sources of water (NCW, 2005). In urban areas, women and girls spend hours waiting in line to collect intermittent water supplies at standpipes. These burdens on women in water-scarce areas affect the health of women, which in turn affect the wellbeing of the family. Consumption of contaminated water leads to adverse health conditions, for women, men, and children.

Recently, there has been an increasing recognition of limitations of capacity of government agencies to effectively manage development programmes. As an alternative, governments have been assigning greater roles to the Non-Government Organisations (NGOs), private sector agencies, and community based organisations (CBOs) for ensuring greater participation of people. This shift in approach has been observed in various sectors including drinking water and sanitation services, which is of important concern for its direct bearing on peoples' health. In this regard, this paper proposes the involvement of women's self-help groups (SHGs) to be used as a platform to resolve water conflicts. Among the SHG members, this study advocates to identify and train 'water negotiators' in water stressed areas. These water negotiators can participate in water debates and influence water policy decisions. Through these negotiators, the paper proposes to build the capacity of SHGs to resolve water conflicts in favour of women's needs.

2. Gender matters

In most cultures, women are primarily responsible for the use and management of water resources, sanitation, health, and nutrition at the household level (DESA 2005; SDC 2005; UN-Water 2006). Hence, women are referred to as water-users and water-managers (IFAD 2007). They play a major role in domestic water management in areas where safe water and drainage are not available in the house (Watts 2004). The gendered division of labour limits men's contact with water resources to be related

to economic activities such as fishing and irrigation, whereas women's contact is more prolonged as a result of domestic roles, including the collection of water, washing clothes, child care, and the use of water for cooking and other household activities (United Nations 2008). Women have the most stakes in issues related to water, and have the accumulated wisdom regarding water location, quality and storage methods. They are best placed to educate children in matters related to hygiene, and to understand the impact of poor sanitation on health (DESA 2005; UN-Water 2006). Women's knowledge about the reliability, location and seasonal variation of local water sources is a precious resource gained through personal experience, and through interpersonal and intergenerational contacts with other women (SIDA 1994).

In the past few decades there has been a changing emphasis on the perceived role of women as primarily recipients and beneficiaries, to women as managers of water resources (United Nations 2005). Since women bear the brunt of the burden of poor management, they should be empowered through greater and more effective participation, and women's involvement would improve governance (United Nations 2005). The importance of women in water management has been highlighted in various policy documents (World Bank 1993; SIDA 1996; Verhasselt 1998; UNDP 2003; DESA 2005; United Nations 2005, UN-Water 2006). When both men and women are consulted, water projects are likely to be technically appropriate, conveniently situated, and well-used and maintained (United Nations 2005). In the United Nations resolution on International Decade for Action, 'Water for Life' (2005-2015), a special emphasis is placed on ensuring the participation and involvement of women in water development efforts (UN-Water 2005). There are close linkages between women's empowerment, and certain millennium development goals (MDGs) (UNDP 2005). Evidence shows that the meaningful involvement of women in water resources development and management can help make projects more sustainable, and ensure that infrastructure development yields the maximum social and economic returns to enable progress regarding the Millennium Development Goals (GWP 2006).

Women are the first benefactors of better water situation. With water available closer to home come three things—greater self-esteem, less harassment of women, and better school attendance by girls (DESA 2005). Primarily, it reduces the burden of fetching water to home that often rests on girls and women (IAEA 2007). The reduction in water-borne diseases benefits women and children by decreasing the amount of productive time lost to illness, by better attendance at school, and by decreasing the burden of care and women's time released for other activities (United Nations 2005). Providing physically accessible clean water is essential for enabling women and girls to devote more time to the pursuit of education, income generation, and even the construction and management of water and sanitation facilities (UN-Water 2006). Being users and managers, women are also the first victims of poor quality management of the water and sanitation sector. Poor women regularly cite water – accessible, clean and in sufficient supply – as a priority in their vision of a better future. Without effective water management, women's capacity to achieve a healthy, secure and dignified life is substantially compromised (CARE 2011).

3. Water conflicts and challenges of fresh water management

Conflicts over a resource, in general, are associated with its scarcity and the resultant competition. Water conflict can happen essentially at four levels. At the first level, conflicts can occur among households within a community over access to a water point. In a water scarce region, households compete among themselves to have control over community/public water resources. This level of conflict arises at the user level, not from the supply side. For a given supply to a community/public source of water, since the supply timing and quantity are inadequate for the users, conflicts arise among households dependent on the source. The second level of freshwater conflict can arise among different communities within the domestic sector. This conflict emanates because of unequal share of water by municipal authorities to different section of people. For instance, for the city of Mumbai, Municipal Corporation of Greater Mumbai (MCGM), supplies 90 lpcd (lit per capita per day) to non-slum areas, but to slums the supply can be as low as 25 lpcd (Sule 2003).

The third level of conflict can arise out of sectoral distribution of water where demands from different sectors can strain the limited resource. For instance NCW (2005) reports intense competitions among different types of users (agriculture, industry and the domestic sector) is pushing the groundwater table lower and lower. The last level of conflict can be seen at the regional level where the conflict is between rural and urban areas or between provinces of a nation state due to water sharing issues between upper and lower riparians. Such conflicts can also happen between countries that share a river basin.

In the containment and resolution of the above mentioned conflicts, women's participation is essential. Traditionally, though women are the primary end users of water, their voice is not heard in water-related consultations, and they are not involved in water management or decision making. They, in general, have less access to power and assets (SDC 2005). The subordination of women and water crisis feed on each other. Water crises burdens women with more adversity and weaken them in the process; this results in women having a lesser say in the water decisions of family and community, which brings in more crises. In order to come out from this trap, this paper proposes SHGs as a medium to resolve water crises and conflicts.

4. SHG – A fairly successful endeavour

Self-Help Groups (SHGs) are now perceived as an increasingly important tool to facilitate women's empowerment. SHGs are constituted and facilitated by governments, NGOs and others agencies as a policy and programmatic instrument. By definition, SHGs are nonprofessional organisations formed by people with a common problem or situation, for the purpose of pooling resources, gathering information, and offering mutual support, services, or care (CUP 2013). An SHG is a voluntary association of the poor with a common goal of social and economic empowerment (Ganesh Murthy *et al*. 2002) to solve their common problems through self and mutual help (Ghadoliya 2004), to have a collective voice against common oppression and exploitation, and to improve skills and capacities to manage resources (Dwarakanath 2002). SHGs are supposed to be self-governed, peer-controlled, small and informal associations, typically constituting 10–20 women from the same

socio-economic background, who are organised around savings and credit activities (Ghadoliya 2004; NCW 2004). The activities of SHGs include thrift and credit management, natural resource management and development work, literacy and community education, information management, mutual support, and nutritional security *etc*. The knowledge base of self-help mutual support groups is experimental, indigenous and rooted in the wisdom that comes from struggling with problems in concrete, shared ways (NSW 2004).

SHGs have succeeded in India (Reddy and Nathan 2013), both in quantitative and qualitative terms. SHGs have had a phenomenal growth in India, growing at an average annual growth rate of 82% during 1993–2006, and the credit amount grew at a rate of 110% (Fouillet *et al*. 2007). The bank-SHG linkage programme, which started in 1992, covered over 6,20,000 SHGs by the financial year 2005–06, involving over nine million households of whom over 90% were women members, with a record of 95% on-time repayment of loans (Tankha 2002; Fouillet *et al*., 2007). Women's SHGs have enhanced the status of women as participant decision makers and beneficiaries in the economic, social and cultural spheres of life. They have sensitised women members to take an active part in socioeconomic progress of rural India (Chitagubbi 2011; Das 2012). SHGs are an effective strategy for poverty alleviation, women's development, and social empowerment (Chitagubbi 2011), which not only benefit individual woman and women's groups, but also the family and community as a whole through collective action (Chitagubbi 2011; Das 2012). SHGs are being promoted by NGOs, and are being recognised by financial institutions and the Government of India as powerful vehicles for empowerment of women through participation and employment generation (Puhazhendhi and Jayaraman 1999).

5. Role of SHGs in water conflict resolution

Since women are the prime users and managers of water, and the prime victims or beneficiaries of water systems, it makes sense, both by the logics of ethics as well as of common sense, to encourage women to become water negotiators in participating, in developing strategies, in resolving water conflicts. Considering that women are the main users of water, in both rural and urban

areas, their participation as water-scientists, engineers and policy makers is an urgent moral imperative in respect of democratic governance (Deshingkar 1995). It is also increasingly recognised that women's considerable knowledge of water (including quality, reliability, and storage methods) acquired through the experience of countless generations as managers of domestic water is too often not taken into account by decision makers. The latter still ignore this hidden chest of knowledge as one of the major keys to the success of water resources development and irrigation projects (Aureli and Brelet 2004).

Furthermore, the exclusion of women from the design, planning, and decision-making of water resources projects is not only a major obstacle to the improvement of their well-being but, also, has squandered the skills and energy of half the world's population that could be used in developing countries to provide water services and manage natural resources, thus contributing to sustainable social, economic, environmental and personal development (World Bank 1995; WWC 2000; Hamdy *et al*. 2007).

Institutional arrangements designed at the community level offer an effective mechanism to address conflicts occurring amongst water managers and users. At times intervention by external agencies is sought for facilitation and arbitration (Waterwiki 2013). Hence, at the level of the local communities, SHGs can be the appropriate organisations for resolving such conflicts. Since women tend to be better involved in environmentally sustainable activities and environmental management than men, some literature argue for utilising SHGs as a platform for environmental resource sustainability programmes. Involvement of women in development programmes through SHGs can effectively increase awareness regarding environmental sustainability (Khatibi and Indira 2011). There is evidence to show that the involvement of women makes projects more effective and sustainable (WSSCC 2004; Chan and Nitivattananon 2006; Khatibi and Indira 2011). A World Bank evaluation of 122 water projects found that the effectiveness of a project was six to seven times higher where women were involved than where they were not involved. The results of involving women in the design and planning stages are multiple, from reducing corruption, increasing management

transparency, better financial management, and empowering women by example (WSSCC 2004).

Development of water negotiators

The above discussion shows the necessity of the involvement of SHGs in water negotiation both in rural areas and in urban slums. Scarcity of water along with poor infrastructure and inadequate basic amenities worsen the situation in rural areas, which needs immediate action. Similarly, in slums, because of over-population, congestion, and lack of water and sanitation infrastructure, people consume poor quality and quantity of water, which adversely affect their heath. Since in the Indian context, SHGs predominantly exist in rural areas and in urban slums, these groups can be used as a platform to resolve issues related to water sanitation and hygiene through raising awareness, promoting scientific literacy, and by building capacity for informed decision making. Collectives of SHGs typically have a three-level structure, with the SHGs at the bottom. Typically, about 15–50 SHGs make up to form a 'SHG Cluster' with either one or two representatives from each SHG; several clusters constitute an SHG federation (Reddy and Nathan 2013). Also, the SHG structure up the ladder can be utilised to advocate water issues in different fora, and to influence water policies through direct participation in negotiations.

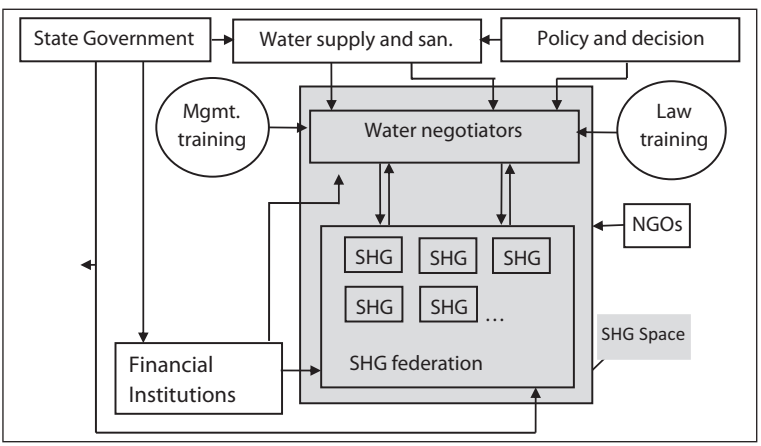

Fig. 1 Stakeholder linkages involving SHGs into water management and conflict resolution

A schematic relationship between different stakeholders for the suggested strategy has been shown in Figure 1. Some skilful and enthusiastic members of SHGs can be trained on legal and management practices to emerge as 'water negotiators'. These trained water negotiators can participate meaningfully in resolving water conflicts. Policy-makers, and decision makers can consult with these water negotiators before taking any major decisions. The government and its agencies can benefit from the actions of women water negotiators. More pragmatic, holistic, and gender friendly decisions can be taken which would be more viable and sustainable. This concept of women negotiators is likely to succeed for two specific reasons. First, on one hand women are the prime victims of poor water and sanitation services, and on the other hand they are the prime beneficiaries of improvement in such services. Since the victims and beneficiaries and the decision-making body is one and the same under a SHG structure, the decisions taken will promote better water strategies and practices. The second reason for the high probability of success of this strategy is that 'water-negotiators' are proposed as diffusion targets, not millions of 'end-users'. The demonstration of water management strategies at SHG federation, cluster, and SHG levels will not only generate awareness about water, sanitation, and hygiene management in water-stressed areas, but will also stimulate scientific and technological temper at the grassroots level, and enable women to participate in informed decision-making.

6. Concluding remarks

This paper proposes to utilise SHGs as a medium for water management and conflict resolution. Channelising capacity development through SHGs can improve water, health, hygiene and sanitation in water-stressed areas. Success of SHGs, and the centrality of women in water management and health-care endorse this position. This paper proposes that water negotiators from enthusiastic members of SHGs should be promoted and trained in management and legal aspects. Consulting water negotiators would lead to more holistic, pragmatic, and sustainable solutions to water conflicts.

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Water related conflicts and gender equity: beyond rhetoric

Smita Mishra-Panda

1. Introduction:

Conflicts are an integral part of the water sector, and over the years have become more widespread and intense. The demand for drinking water, agriculture/irrigation, industries and other uses is growing rapidly. Conflicts are over access to water for different uses. These arise due to absence of proper democratic, legal and administrative mechanisms to deal with the issues that are their causes (*Joy et al.* 2008). Further, the nature of water is such that it is divisible and amenable to sharing. It is a common pool resource where a unit of water used by one user is a unit denied to another. It has multiple uses and users and involves resultant trade-offs. In this context, excludability is an inherent problem, and the costs are often very high requiring an understanding of watersheds and inter-basin transfers, and the manner in which water is planned, used and managed causes externalities (both positive and negative) many of which are unidirectional and symmetric (*ibid*; p. xviii). The different configurations of conflict may relate to disputes between countries, between administrative units inside the countries or simply between groups of people.

Stakeholders related to water are growing in number, and interrelations among them are complicated. For example, environmental problems are complex, leading to climate change, and water scarcity is increasingly becoming a problem in erstwhile water abundant areas. Likewise religious and ethnic conflicts in some geographical areas have further aggravated conflicts over natural resources, water being one of them. At another level, increasing cultivation of crops requiring huge amounts of water can clash with the needs of water for domestic purposes. The same goes for increasing water needs for industries.

Although all water policies – both at national and state levels - very clearly pronounce that water for drinking and

domestic use (personal hygiene, cooking, washing and caring for livestock) should be given first priority in water allocation, there is a need to look at the ground reality where several factors intermesh in determining the supply of water for domestic use. The larger picture is that improved water management for sustainable development, poverty alleviation and biodiversity preservation can minimise water conflicts. On the other hand, there are several documents that very clearly state the need to move away from purely technical improvements and sectoral solutions to more basic social and sustainability goals. For the latter to translate into action, a gendered perspective in water management assumes significance (Lahiri-Dutt 2006; Zwarteveen *et al*. 2012).

In developing countries, women and girls spend around 40 billion hours every year hauling water from distant and frequently polluted places. They spend as much as eight hours per day carrying upto 40.8 kg of water on their head or hips. This is not to undermine the role of women in irrigated agriculture, and in small-scale income generation activities. However, what is observed is that within the framework of gender-based division of labour, poor rural women, and those belonging to low-income urban households are by and large responsible for provisioning water for domestic use. The time lost in collection of water is not directly remunerative. In addition, women are essentially being overburdened with domestic responsibilities of household work as well as with economic activities; subordinate position at the both the household and societal level, governed by patriarchy and cultural values; lack of land rights that are closely tied with water rights; prevalence of patriarchal values that get translated to exclusions from public decision making; lack of skills for participation; low self-confidence; and the general absence of women from managerial, engineering, and policy-making levels of society.

Such patriarchal values and traditions create certain barriers that affect women in participating at equal footing in most formal water management interventions despite their significant role in traditional community-based management systems and practices. Poor landless rural women and low-income urban women are at the receiving end with respect to access to water. They are the worst affected when there are conflicts over water.

The gender dimensions of water related conflicts have to be seen in two ways – a) where water conflicts have a differential impact on women and men; and b) where gender inequity as a variable has a bearing on water conflicts.

This paper is divided into four sections. After the introduction, the second section outlines gender mainstreaming in water management, discussing at length the meanings and implications of a whole range of manuals on gender mainstreaming in water management. The third section is a critique of gender mainstreaming in water management and conflicts. In lieu of a conclusion, the last section provides for possible ways of incorporating a gendered perspective in addressing water conflicts.

2. Gender mainstreaming in water management

Some parts in this section draw from the author's earlier work on gender mainstreaming (Panda 2007). Gender mainstreaming has been considered to be a panacea for any gender-related deficiency in water management including water conflicts. Essentially, it implies that good water governance is the only way to curb and manage water conflicts. The principles of gender mainstreaming were first developed by feminist development practitioners in the 1970s. It was strongly promoted in 1995 during the United Nations Conference on Women in Beijing. With the announcement of the MDGs, gender mainstreaming in several other development sectors has been recognised (Lahiri-Dutt 2006). A plethora of manuals have been produced in the last decade dealing with the subject of gender mainstreaming. Gender mainstreaming has become a buzzword for gender equality, and this echoes in numerous declarations. The definition of gender mainstreaming was provided by the United Nations (1997):

> Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or program, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies

and program in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality.

The ultimate goal of mainstreaming is to achieve gender equality, but adequately recognising and addressing gender divisions, roles and identities also contributes to the effectiveness, efficiency and sustainability of water management. The key is to bring the experience, knowledge and interests of both women and men into the development agenda. If applied in both letter and spirit, gender mainstreaming can effectively minimise water conflicts. So the question is whether gender mainstreaming is making that desired impact in water management. Table 1 lists some of the salient features of a few of the more prominent manuals/documents on gender mainstreaming in water management.

Table 1: Gender mainstreaming in water management

S.No	Name of the manual/document	Salient features
1	A Gender Perspective in the Water Resource Management Sector: Handbook for Mainstreaming (SIDA 1996)	This handbook for mainstreaming contains specified questions to be asked at each stage of the project cycle which cover issues ranging from how consultation is designed, how specific indicators of gendered involvement are used, to whether budgets are allocated to ensure gender-equitable approaches
2	Gender Mainstreaming: An essential component of sustainable water management – Global Water Partnership (2005)	Emphasis is on creating an enabling environment – policies, legislation and financing - to institutionalise equitable participation of women and men, to secure resources to support the necessary structures and programmes. Also promote 'Gender Analysis' as the backbone of gender sensitive policy development.

S.No	Name of the manual/document	Salient features
3	Effective gender Mainstreaming for Sustainable Livelihoods: From guidelines to practice – Both Ends Working Paper Series and Gender and Water Alliance (2006)	Highlights why gender mainstreaming (GM) is not happening in water management and the gaps in intentions and practice in GM in a project format. Recommends how to facilitate GM in WM by giving a minimum agenda and possible follow-up steps to further develop and implement the proposals.
4	Mainstreaming Gender in Water Management: Resource Guide – UNDP, Gender and Water Alliance, CapNet, IRC (2006)	Facilitate access to available resources/literature on gender and IWRM; improve the sustainability and effectiveness of water related activities through incorporation of gender equality and social equity analysis; improve the understanding of gender and IWRM.
5	Franework for Gender Mainstreaming: Water and Sanitation for Cities – UN Habitat (2006)	GM Strategic Framework (GMSF) has facilitated the documentation of critical issues related to gender and water and sanitation services in urban areas of Africa and Asia.
6	Why Gender Matters in Water Management? - CapNet and Gender and Water Alliance (2005)	In the contexts of water supply, sanitation, agriculture, environment – the focus is on problems, benefits of a gendered approach, and how to get the benefits. Emphasis is on IWRM.
7	Gender, Water and Sanitation: A Policy Brief – UN Water and the Interagency Network on Women and Gender Equality (Water for Life 2005-2015).	Focusing on the involvement of both women and men in water and sanitation management at all levels – national govts, regional/local govts, communities, CSOs, donors, international organisations; highlights how MDGs can be met in the process.

Most of the manuals and documents give a comprehensive account of what is gender, gender equality, and mainstreaming in the context of water management, and integrated water resource management (IWRM). Mostly prescriptive in nature, they are all convincingly written and explained, especially the significance of gender in water management. To a great extent the link between gender and water management or integrated

water management is also convincing. The problem arises when one wants to translate this into action – make women visible, voice their opinions, and include them in the water users' management committees.

The author has conducted several gender mainstreaming exercises in water management programmes for practitioners and grassroot-level functionaries working in the area of gender and water. In most events, the discussion centres on how to operationalise mainstreaming, and to do things differently from what they have been already doing. The gaps between intentions and practice in gender mainstreaming has been succinctly brought out by Both ENDS (2006) - "the absence of meaningful integration of gender questions in mainstream water analysis and discussions; and the lack of real on-the ground efforts to effectively address gender differences and inequities in water" (*ibid*: p. 9). Similarly one needs to grapple with the question as to what needs to be done to address gender inequities in field projects, research and policy frameworks, The first reason could be that not all have access to the manuals and documents on gender mainstreaming.

The second reason could be the gaps between the literature and the real situation at the ground level or the lack of cultural sensitivity. What is missing is, transformational organisational cultures and policies. The situation, therefore, calls for a redistribution of powers, resources and opportunities in favour of the marginalised, including women. A key problem seems to be the lack of transformation in patriarchal power/gender relations.

Some of the often repeated remarks by participants of gender mainstreaming in water management exercises conducted by the author during the period 2003-2008 were:

"In reality it is difficult to give equal importance to women and men in any water scheme, as it is society that decides who is important where".

"Only if women are formed into groups, they can make a difference in water management, and very seldom along with men".

"Men are better negotiators and their participation will lead to better outcomes in water management, and women can be simply part of the group and take benefits".

What emerges is that to execute gender mainstreaming in water management by practitioners is entirely different from providing recommendations on paper.

By and large, gender mainstreaming in the designing of water plans and actions would entail three steps: (a) conducting gender analysis for the purpose of developing a knowledge base for decision-making; (b) center-staging women in the decision-making process; and (c) developing gender-disaggregated indicators and incorporating them in monitoring and evaluation systems (GWP 2006). For instance, gender analysis in water management relating to uses of water and its different sources—both individual and community based—would invariably reveal that women are by and large engaged in provision of water for domestic uses. However, it should be borne in mind that women are also engaged in agricultural tasks as farmers where irrigation water is a critical input, particularly in dry and semi-arid areas. A rigorous gender analysis would give an idea about the locus and significance of decision- making in water management. The outcome of the gender analysis would be of great relevance in center-staging women's concerns in the designing of water interventions for drinking and irrigation purposes. Similarly, gender-disaggregated information in water management would facilitate better monitoring and evaluation, especially by involving different stakeholders (participatory) both at the individual and community levels. Further, gender analysis has a potential to identify factors influencing change (positive as well as negative) that would go a long way in addressing them for effective and equitable water management as well as solving conflicts (*ibid*).

One of the major questions at this point is - who are the likely stakeholders in operationalising gender mainstreaming? In developing countries, the governments are hardly concerned about issues such as gender and equity. Therefore, it might be impractical to expect water officials to be sensitive to such issues. Similarly, there is little chance that the private sector would be inclined to consider gender issues in water related projects and

programmes. They would be inclined only when interventions lead to some profits. Lastly, there are NGOs who are working closely with people at the grassroots level, who should be most interested in gender and equity concerns of any development intervention.

The case of Self Employed Women's Association (SEWA) in Gujarat is a case in point. SEWA is a committed organisation. It has an understanding of gender mainstreaming, and probably it also has the potential to make a difference. But it works only with women on an activity called "Women, Water and Work" Campaign. Women, Water and Work Campaign also known as the Millennium Campaign was started in 1995 in Gujarat, when SEWA realised that women's lack of access to water has a direct impact on their livelihoods in terms of time, health and income. Water was the one single issue around which SEWA's membership expanded manifold. The campaign activities can be broadly classified as:

1. Raising women's awareness, and also that of their families regarding water-related issues such as saving water, and its availability, hygiene, functioning of the government apparatus, and so on;

2. Establishing local water user groups (of mostly women leaders) called Pani Samitis (water users groups) for the maintenance and management of community water sources;

3. Building the capacity of women through leadership and technical training in repair and maintenance of hand pumps, operation and maintenance of piped water supply schemes, and monitoring the performance of government water supply activities; and

4. Augmenting existing community water supply systems through construction of roof-top rainwater harvesting systems, upgrading and repairing traditional water sources and micro-watershed development (Verhagen and Agarwal 2004).

The most significant impact of SEWA's 'Women, Water and Work' Campaign has been the empowerment of women in

terms of their capacity (technical training) to undertake activities independently or collectively in the public domain. The success of the campaign can be clearly attributed to the institutional arrangements at the community level (formation of pani samitis); the leadership initiatives which mobilised women at the village level; the role played by women's collectives in sustaining the activities of the campaign; women's sense of ownership of local water resources and infrastructure; the democratic and transparent process of distribution of benefits among community members; and, above all, the strong cohesiveness among community women (Panda 2006).

The 'Women, Water and Work' campaign has enhanced and strengthened women's collective agency. In rural Gujarat, collective action is a strategy that women have successfully adopted to come together as a group, network and work with SEWA. As individuals, their voices are subdued, and, they are unable to make any significant impact at the community level. However, in the public domain, women are able to undertake activities related to the campaign independently of men, thereby demonstrating an increased sense of ownership and confidence in water management. The 'Women, Work and Water' campaign has shed light on certain significant principles that have the potential to guide interventions in the water sector. What clearly emerges is that through women's collective action (mobilisation and formation of grassroots institutions), good governance for sustaining local water management and 'engendering' of the state to some extent are possible.

Still, the larger question remains as to whether the impact on gender relations that is observed at the collective level has percolated to the household level. Within the household, women tend to avoid conflicts, and take on the burden of all domestic responsibilities so that they are not prevented by their husbands from going out to work for the water campaign. While an increase in income places women in an advantageous bargaining position within the household, visible changes in gender relations are yet to occur in the private sphere. Indeed, observations in the field indicate that even if gender-equitable change processes have begun at the household level, they are yet to produce a significant impact (Panda 2006, 2007; Panda and Sannabhadti 2012).

Though SEWA functionaries are very positive about the changes in women's condition and position since the start of the campaign, the reality is that there is a long way to go for women to achieve a footing equal to men. The campaign has the potential to change gender relations at the household level when women use their collective strength to take on issues like violence against women, son preference, and neglect of the girl child (which is very rampant in rural Gujarat). In other words, it would mean that constraints within the household need to be critically examined and explored in order to understand changes in gender relations as a fundamental aspect for any collective action to take place beyond the household. And it is this change that can go a long way in addressing water conflicts as it is a public domain affair (Panda 2007). SEWA's water campaign is an example which has contributed to gender mainstreaming to an extent where women are visible in the public domain in local water management. The government has realised the potential of women, and has intervened to enhance their agency, which is a crucial input to mainstreaming gender and developing leadership qualities among grassroots women. Yet, real gender mainstreaming would require moving forward keeping both women and men in view and not just women as in the case of SEWA. A word of caution here, gender mainstreaming is not about getting rid of the focus on women. There is a need to center-stage women's concerns by looking at the larger context in which they are placed at the household and community levels as well as in relation to the state and the market. Only then power relations at different levels can be addressed to bring about change. Needless to say that the household is the most complicated site, and many efforts need to be initiated here to bring changes in gender relations (*ibid*).

A study conducted by Fleischli (2006) on relevance of gender in the Cauvery dispute (between Karnataka and Tamil Nadu) by demonstrating the ways people are affected by the conflict and how conflict management is differentiated by gender. She has come up with some new understanding which reveals that the 'structure of gender' dimension seems to be of primary importance in water conflicts. Cauvery is personified as a woman who has a closer and stronger connection with the women as compared to men. Therefore, the dispute or conflict over a culturally and religiously meaningful resource may have

a differential impact on gender. However, it has also contributed to the passive presence of women in the conflict resolution mechanism. Women do most of the work related to water and with the persistence of the conflict, are hindered in their daily tasks to a greater degree compared to men. But women hardly participate in any discussions on managing conflicts. What Fleischli argues is that there is a need for consideration of gender in the management of water conflicts like Cauvery that has the potential to counter gender-specific discrimination and to help reduce inequality. She also recommends further that greater involvement of women could have implications for achieving goals of sustainability and social justice. Strategies, therefore, have to be designed to include gender at all levels of conflict management and facilitate access to forums of conflict management for women. More systematic research is needed to understand the symbolism of gender in view of politicisation of the dispute, and its resolution and transformation (*ibid*).

It is convenient for all concerned not to take into consideration gender issues in water conflicts. Some feel it is too complicated to include such issues in water conflicts as they are unable to see entry points and move out of their safety grooves. Addressing such issues would entail risks and one has to risk the risks. How can it be accomplished is the biggest question, and if there was any blueprint it would have made solving water conflicts simpler. Entry points with a gender focus become cumbersome for many, and planners would prefer to ignore this issue (Both Ends 2006).

There are several water networks all around the world working on gender and water issues. The author coordinated one such network for four years. It is good to be part of such networks to learn from people's experiences from all over the world. However, such networks function as exclusive clubs, and are unable to make any impact on policies and strategic actions for meaningful water management or in addressing water conflicts leave alone gender issues. There is no systematic effort to deal with such issues. The Gender and Water Alliance is one network that has attempted to come up with relevant manuals that can be operationalised. But the outreach seems to be limited.

3. Critique of gender mainstreaming

This section largely draws from the author's previous work on the issue where she has argued for a critical perspective to understand gender mainstreaming in India by exploring the linkages between pre-given notions of 'gender' in mainstreaming rhetoric and water management practices (Panda 2007). The example of Self Employed Women's Association's (SEWA) 'Women, Water and Work' campaign, and the recent water sector reforms in the country have been used as the basis for analysis.

Experience from SEWA's 'Women, Water and Work' campaign shows that the time has come to move beyond the obvious benefits of their interventions through women's collectives which has no doubt contributed to the mainstreaming process. In the public domain, women are able to operate as a group with confidence. However, changes at the household level are crucial to bring about a transformation in gender relations. This would imply addressing women's strategic needs such as access to economic opportunities, acquiring skills through education and other kinds of training, access to property (house and land), and access to institutions to enhance their capacities. Gaining support of men in women-led water interventions is very much a part of mainstreaming. Further, an attempt at dismantling patriarchal structures can be made only when the complexity of gender relations is well understood by implementing organisations like SEWA. Hence, engaging with men at different levels is a necessary step towards bringing about transformation in gender relations.

Water sector reforms often promote community participation in which women may have ample opportunity to be involved. But some other tenets of reforms, especially those related to commodification of water, negatively affect women and other marginalised groups. The reform policies sometimes work against existing regimes (Cullet 2006). Awareness about water sector reforms at the level of the individual, particularly among marginalised groups and women, may be very low which needs to be overcome.

Existing water laws fail to operationalise the human right to water and are unable to adequately address other social challenges,

including the gender gap in the water sector. There is a need for a comprehensive rethinking of water reforms so as to benefit the poor and women, and to prevent the complete commercialisation of a sector directly concerned with the fulfillment of this human right. Exclusion of a gender perspective in the SEWA case and marginalisation of women in the privatisation approach to water management will hinder the process of gender mainstreaming if the same is to be realised to the fullest extent possible. Further, there is a need to bring all gender mainstreaming efforts made in isolation to a common platform. Rao and Kelleher (2005) call it the 'politics of solidarity', which can facilitate in strategically assessing how to advance the transformation agenda, especially when it is difficult to bring about a convergence among a variety of political and institutional constituencies, with a common understanding of gender mainstreaming.

4. Water conflicts and gender – what is possible?

Although gender is realised to be an important variable in water conflicts, this dimension has received little attention so far. There is a gap that requires systematic research to determine the significance of gender in water conflicts, and to track how it can contribute to the management of conflicts. As already mentioned in the introduction, there is a need for proper democratic, legal, and administrative mechanisms to deal with water conflicts. Gender should be made an integral part of managing water conflicts. Therefore, it is necessary that both women and men should effectively participate in better water management, and thereby minimise conflicts. Both women and men should be consulted in managing or solving conflicts as it has a differential impact on them.

Ensuring that both women and men influence decisions and resource allocations in water management would imply going beyond merely increasing the number of women in different positions. If gender equality in water management is a political project, it is essential to provide substantial opportunities to both women and men for influencing agendas, institutions and processes of water management and conflicts. Further, appropriate institutional development is required to counter those traditions and norms that constrict women's potential. According to Rao and Kelleher (2005), besides institutional

change and organisational transformation, there is a need to create enabling environments (supply) and to mobilise women's groups for rights and access to power and resources (demand), which would require strong, influential political advocates.

It needs to be repeated that gender mainstreaming in water can happen only when the perspectives of both women and men inform design, implementation and outcomes of policies and different programmes on water—drinking, irrigation, sanitation, watershed, including conflicts and other related activities. This would imply analysis of the gender perspective at every step of water management, and using this analysis as a basis for water policy formulation, for programme development, and for conflict resolution. Gender analytical frameworks have a great potential to address gender inequalities and injustices in society, and, if used creatively, they are political instruments that can bring about transformative change (Mukhopadhyay 2004). Presence of gender expertise at different levels of the governments as well funding agencies and civil society is also important to ensure that a gender perspective is included in all plans, policies and corresponding programmes. Women have to get represented in the fora for water conflict management in their own right as farmers and land-owners.

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Invisible people: Migrant labourers in the context of Integrated River Basin Management

K.G. Sreeja and P.K. Shetty

1. Introduction

The concept of river basin based management is strongly rooted in participation of stakeholders in the planning, decision making and implementation processes. It also visualises equitable sharing of resources of river basins in the context of integrated management (GWP 2000). A stakeholder can be defined as an interested individual, group or institution that may or may not be affected by decisions or actions pertaining to a specific resource, and may or may not be part of decision-making about the resource. Experiences of Integrated Water Resources Management (IWRM) from various countries across the world bring out critical issues regarding identification of stakeholders in river basins and their involvement in basin management. In most cases, stakeholder participation is found to be an elusive concept with no serious thought or effort given to addressing context-specific issues in identifying stakeholders, or ensuring their representation and power in decision making (Clever 1999; Wester *et.al.* 2003; Thompson 2003; Clever and Franks 2005).

Very often, a river basin is conceived to be an ideal space in which all inequalities of resource relations are expected to disappear with the waving of the stakeholder wand. There is scant acknowledgement of the hard won, and in many instances yet to be achieved, citizenship rights, and the very real socio-economic differences that exist between people and affect resource interactions (Barham 2001; Warner *et. al*. 2008). This is typified by the notion of stakeholders as water users with recognised water rights, thereby excluding those without rights over the resource. Where water rights are linked to land ownership, such stakeholder definitions will clearly exclude marginalised people who may primarily depend on other ecosystem services in the basin than the agricultural production function (Mollinga

et.al. 2007). Fishermen and women gardeners were found to be excluded from irrigation-project management committees in Sri Lanka (Bakker *et. al*. 1999), women have been excluded from water user association membership in the Andes (Vera 2005), and the rural poor including small-scale irrigators have not been represented in Mexico's river-basin councils (Wester *et. al*. 2003).

This raises the crucial question of how much and what kind of stakes qualifies one as a stakeholder in the river basin management process. The question gains added relevance considering livelihoods diversification in regions that were earlier predominantly agrarian. In these regions there have been shifts in the use of natural resources within the river basins along with rising value and demands on these resources. This process has been changing the nature of resource interactions worldwide. The ownership of and access to basin resources, especially land and water, are getting redefined. This has far reaching consequences for the marginalised and vulnerable sections of the society including a huge informal labour force that is often migrant and transient in nature. River-basin level natural resource management is about to be implemented in India. The emerging non-agrarian linkages to basin resources other than ownership and rights will have to be seriously considered. This is important to visualise the very existence of the vulnerable sections of a river basin. These sections include adivasis, dalits, small and marginal farmers, women, and a burgeoning labour force in the informal sector who have varied and nebulous relationships with basin resources.

This paper addresses the emergent issues of resource governance and stakeholder priorities within the Chalakudy river basin in Central Kerala which is undergoing rapid transformations into non-agrarian livelihood avenues. Within the non-agrarian utilisation of basin resources, there is a huge influx of migrant labourers into the river basin's rural spaces. There are numerous studies on migration and its effect on the resources through labour loss and capital gain through remittances (Zachariah and Rajan 2006; World Bank 2006; Sasikumar and Hussain 2007; Barbora *et.al.* 2010). The challenges in the implementation of IWRM due to large-scale loss of labourers by migration and the influence of remittance capital on basin resources have also been reported (Turton *et.al*. 2006; Tayler and Fajber 2009). But

in-migration into the basin, especially into the rural spaces, also brings in new issues in resource transformation, and raises critical questions of rights to resources and impacts on resource use and management.

In this paper, we have tried to explore the extent of in-migrant labour force in the lowland rural space of the Chalakudy river basin, their relationship and linkages with the basin's resources, and the implications for integrated resource management at river basin levels in the state of Kerala. This paper has evolved from a study to understand the nature of emergent non-agrarian livelihoods, and the transforming linkages to the natural resource base in the various agro-ecological zones of the Chalakudy River Basin.

2. Methodology and the study area

Field work for the present paper was done during 2009. The various agro-ecological zones of the Chalakudy river basin in Central Kerala were delineated, and questionnaire surveys and interviews were undertaken in one representative village in each of the zones identified. In the low land zone, primary questionnaire survey was administered at the household level for a sample of 450 households, in which details about landholding size, land use, employment and enterprises where the members of the sample households are working were collected. But it was soon realised that the survey of the sample households selected did not capture the transient migrant working population in the village. Therefore, structured interviews were conducted among entrepreneurs and the working population at the enterprise level, where the sampling units were non-agricultural enterprises in manufacturing; mining and quarrying; construction; and transport and other service activities. Focused semi-structured interviews were also conducted among representatives of the local self-government institutions and social activists of the region. Secondary data analysis of Census 2001, and Kerala Land Use Board data on land use was also carried out.

The Chalakudy River Basin, Central Kerala, South India is the catchment of the 140 km long Chalakudy River. This river originates in the Anamalai Hills of Western Ghats and flows west through the Anamalai region of Coimbatore district

of Tamil Nadu, and the three districts of Palakkad, Thrissur and Ernakulam in Kerala to join the Arabian Sea. This river basin is diverse in its landform and land use, consisting of an upper mountainous forested zone with leased-in agricultural plantations of tea, coffee and cardamom; foothills and midlands that support rubber and other perennial tree crops; and plains and lowlands of erstwhile paddy fields now mostly devoted to commercial horticulture, and non-agricultural uses.

Around 10 lakh people live in the basin and the basin dependent regions, deriving their livelihoods in a variety of ways. The occupation pattern in the various zones of the basin over the years shows a decline in the dependence on agriculture reflected in the low percentage of cultivators and agricultural labourers in the total working population in the year 2001.There was observed an increase in the casualisation of labour especially in the construction and transportation sectors. The shift away from agriculture has drastically altered the relationship of the people with the basin resources of land and water that varies across the different agro-ecological zones of the basin. The basin is now characterised by an altering demand on resources of all kinds, and water resources are becoming progressively stressed with reduced flows (Madhusoodhanan 2009). It is necessary to understand the complex and evolving linkages between land, water and people in the basin to creatively address the management of is scarce resources.

This study encompasses the various agro-ecological zones of the Chalakudy River Basin, of which the present work is located in the lowland zone village of *Parakkadavu*, at an elevation range of 8-70 m above msl. The land here is characterised by low-lying paddy lands interweaving a mosaic of hills and slopes. The Chalakudy River flows through the village for about 8 km. *Parakkadavu* village has an area of 24.7 sq.km, and has a population of 29,997 people with a population density of 1216 persons per sq.km. The village comes under the Local Self Governance body of *Parakkadavu* Panchayat. The total working population of the village is only 36% of the population of which 77% belong to the main worker category (GoI 2001). Out of these, 81% are men, and women constitute only 19% of the main work force. Of the main workers 16% are engaged in the manufacturing sector, and another 16% is engaged in 'trade and commerce'. Agricultural

labourers and cultivators form 10% and 9% of the main work force respectively. Of the total land area, around 50% is under perennial crops such as coconut, arecanut and nutmeg raised in mixed homestead gardens. Of the total land area of the basin, 17% is classified as paddy land. Around 56% of the cultivated area is under irrigation, either through the Chalakudy River Diversion Scheme (CRDS) Left Bank Canals, public or private lift irrigation schemes from the river, or through private wells.

3. Shifts in occupational structure and resource relations in Kerala

It is evident from various studies in South and South-East Asia, Latin America and Africa that a profound reorientation and structural change of agricultural livelihoods is emerging across the global South, especially after the 1990s (Bryceson 2009; Rigg 2006; Bryceson *et al*. 2000). These trends point towards diversification of rural occupations with major share of household incomes shifting from farm to non-farm, and, therefore, becoming progressively delinked from land. In India there are very clear signals of a general move away from agriculture during the last few decades. These indicators include the high average age of the cultivator population, part-time farming being preferred by the youth, increasing field fallows due to emigration of agricultural labour force, and a growing proportion of people involved in non-agrarian work in most rural areas of the country (Breman 1996; Chadha *et. al*. 2004; Sharma, 2007). Such a diversification of livelihoods away from agriculture is predicted to intensify in the future, given the current growth performance and pathways of the Indian economy.

A large part of this shift from the primary sector in rural areas has been into the informal sector. As a corollary of this change, the increase in the tertiary sector is found to be sharper than that in the secondary sector. The fastest employment growth for rural male workers, according to the NSS rounds, has been in construction, transport-communication-storage, finance-real estate, and mining and quarrying. For rural female workers, construction, transport-communication-storage, and mining-quarrying have been areas of high employment growth. Simultaneously, there has been a noted replacement of hired labour by family labour in agriculture. There has been

a significant migration of labour from rural to rural or rural to urban spaces in the recent years. Bulk of the increase in the rural non-agricultural sector has been explained by the changes in the employment structure of rural casual labour. This labour shifts back and forth between agricultural and non-agricultural work on a seasonal basis. The share of total non-agricultural workers in the rural workforce was found to be the highest in the states of Kerala, Coastal and Ghats Karnataka, Central Plains of West Bengal, and inland Tamil Nadu (Rao and Nair 2003). The percentage of working population engaged in agriculture and allied activities in Kerala was found to be only 32 % in 2001. The non-agrarian sectors of manufacturing, construction and services *etc*. employed nearly 67% of the workforce (GoI 2001).

With the rise in construction activities in the state since the late 1990s (Prakash 1998) there has been an increase in demand for the raw materials of construction such as sand, stone and bricks. This has led to a proliferation of activities related to construction, and industries such as river sand and clay mining, granite and laterite stone quarrying, and brick and tile manufacture in the rural areas of river basins, altering the resource relations within. There are about 350 tile factories and 5000 brick kilns concentrated around the mid and low land stretches of the Chalakudy, Karuvannur, and Periyar river basins in Central Kerala. The annual clay mining in these basins was reported to be half a million tonnes per annum in 2006-07 (GoK 2010). River sand is another raw material in high demand in the state. It is estimated that the total quantity of river sand used in Kerala was about 32 million tonnes in 2006-07 (GoK 2007). There is an increasing demand for building materials and for the replacement of clay bricks and river sand by cement bricks and quarry sand. To satisfy this demand, there is a large increase in the number of small scale quarries and rock crushing units, especially in the midlands and isolated hills in the lowlands of the state (GoK 2009). The annual production of granite building stone quarried from the state as a whole was 2.9 million tonnes per annum in 2006-07 (GoK 2010).

Ironically, only less than 1% of the working population in Kerala is engaged in mining and quarrying activities. The workforce in this sector as well as the construction and construction related manufacturing industries is dominated

by a large in-migrant labour force which is largely missing in the Census enumerations and National Sample Survey (NSS) estimates because of their floating character (Breman 2010). Temporary and circular migration where migrants work for several months in the host spaces but retain strong links with their native locations is emerging as a dominant trend in India. It is estimated that there are around 100 million circular migrants in India today. These workers have played a large role in sustaining and building India's economy. But their contributions remains unrecognised because of their lack of stake in the resources of the region that they work in (Deshingkar 2006; Deshingkar and Akter 2009).

Therefore, it is evident that along with these emergent sectors of employment, an emergent class of migrant workforce has also arisen in the urban and rural areas of Kerala (Surabhi and Kumar 2007; Kumar 2011). This migrant workforce, off late from the North and Northeastern states of Bihar, Uttar Pradesh, West Bengal, Odisha and Assam, and previously from the neighbouring state of Tamil Nadu, are found to be employed in a variety of economic activities ranging from agriculture to construction in both urban and rural locales in the state. While in the urban areas their presence is mostly in the construction industry, in the rural areas they are found to be engaged in production activities ranging from mining to industries to agriculture. With such rapid transformations in resource mobilisation, how does the question of stake on resources play out in the Chalakudy river basin? If ownership and rights are the criteria, how does the migrant labour force fare in the equation?

4. Changing labour matrix and resource mobilisation in the Chalakudy basin

The lowland agroecological zone of Chalakudy River Basin, in the beginning of the last century, was predominantly a wetland paddy agro-ecosystem both in terms of resource use and occupation (Menon 1911). The CRDS canal water which reached the tail ends during the early 1960s changed this landscape drastically. Prior to CRDS, these regions in the lowland village of *Parakkadavu* were mostly single or double cropped rain-fed paddy lands with raised garden lands of mixed tree crops. With the arrival of canal waters, even the garden lands were converted

to two or three cropped paddy fields so that 52% of the land area was then under paddy. Land reforms implemented in the state during the 1970s lead to reconfiguration of ownership rights over these intensely cultivated land resources.

Large-scale out-migration to the Middle East also started during the 1970s, leading to a reconfiguration of labour and resource availability. Diversion of water in the upstream of the basin due to the interstate, inter-basin Parambikulam Aliyar Project (PAP) resulted in a drastic reduction in the downstream flow adversely affecting the tail-end command areas of CRDS. In a decade's time, these changes brought about in labour, capital and natural resources employed in agriculture heralded an extensive shift in the cropping pattern. These processes also led to the emergence of a strong non-agrarian sector in the lowland zone of the basin. Land under paddy cultivation reduced to less than 20% due to large-scale conversions, and garden lands came to be dominated by nutmeg and coconut.

Various non-farm sectors of employment emerged as major means of livelihoods in the village, employing close to 70% of the workforce by 2001. An increased scarcity of labour for manual works was experienced in all these sectors as a complex result of out-migration of labour force, growth of remittances from the Middle East, and the increased level of education and resultant capabilities and aspirations of the in-basin population. This triggered a huge and regular influx of in-migration of labour into the region. Initially this migrant labour force worked in the ever-expanding construction industry, and in the related units of quarries, brick kilns and tile factories. These migrant labourers, at first sourced from the neighbouring state of Tamil Nadu, and by 2005, from the North and North-eastern states of Uttar Pradesh, Uttarakhand, Bihar, West Bengal, Odisha and Assam, have now come to dominate the manual labour market in the region. Over the last two decades, the influx of labour force primarily deployed by the expanding construction and related resource mobilisation activities has spread to various other sectors.

In the case of the traditionally agrarian *Parakkadavu* village, a large number of in-migrants were hired as daily casual labourers in agriculture and related activities as well. Meanwhile, the depletion of the natural resource base of the region due to

indiscriminate extraction of river sand and clay from fertile paddy fields has had manifold repercussions. The impact of these heavy extractions on water availability and quality has triggered strong public resistance. Such resource depletions and the resultant public protests across river basins in the state has led to stringent regulations such as the 'Kerala Protection of River Banks and Regulation of Removal of Sand Act, 2001' and the 'Kerala conservation of Paddy Land and Wetland Act, 2008'. This in turn has set off the proliferation of various activities in the Chalakudy basin to meet the growing demand for these resources. These activities include illegal mining of river sand, sand and clay from paddy fields, and the illegal manufacture of sand by mining hills. In all these emergent sectors, the in-migrant labour force play a pivotal role in resource extraction. Their presence in some of the major activities is being explored below.

The construction sector boomed in the state fuelled by remittances from migrants, and has continued to grow in the last 30 years. This sector is a major source of livelihoods in the village with around 16% of the native working population employed in it. But the ever increasing demand for labour in this expanding sector is now being largely met by the in-migrant labour force. The use of migrant labour in these sectors is almost two decades old, and has undergone considerable changes in its composition and mobilisation. There are two unorganised migrant labour-markets within the *Parakkadavu* village where the migrant labour force makes itself available on a daily basis for prospective employers. This is in addition to those migrant labourers who affiliate themselves to construction contractors. At the time of the study, there were around 3000 migrant labourers within the village of *Parakkadavu* itself, a large majority of whom were unskilled or semi-skilled workers engaged in private house construction works, public road works, canal works *etc*. On the other hand, only 1700 people from the native working population of the village were engaged in construction sector, mainly as skilled workers.

There are two private house construction firms in the village employing around 100 people each as skilled labourers (masons, carpenters, electricians, plumbers, tile workers, painters) on a contract basis in addition to the migrant labourers and women

from the village itself for unskilled work. There are numerous individual private contractors with their own migrant workforce in the village. Another work connected to construction that is taken up as a subsidiary occupation (which has picked up in the recent years) is well-digging and associated works for water quality and quantity enhancement. In an area where poor quality and quantity of drinking water is a fairly recent phenomenon due to the conversion of paddy lands into housing plots, the digging of new wells and renovation of the older wells is a thriving sector where both native and migrant labourers find employment.

The early migrant labourers from Tamil Nadu during the 1990s were mostly single men in the 20-30 years-old age group, with their families back in their villages. These migrants were from the districts of Dindigul, Madurai and Theni in Tamil Nadu and came through labour contractors. The unskilled workers from states in the North and North-East India who replaced the Tamil workforce were also single men but from a younger age group of 17-25. After their initial phase of migration and establishment, the large scale migration that followed in the past 3 years was through the informal network of friends and relatives. These young migrants, completely ignorant of the nature of work here, spend the initial year in learning at a lower wage by attaching themselves to a contractor or a veteran migrant. They earn between Rs. 120-300 per day based on the nature of work and experience. After gaining acquaintance with the work and the place, they become highly transient for higher wages.

At *Parakkadavu*, the migrant labourers from North and North East in the construction sector were resident there for not more than a year. They were found to stay in groups of 12-20 in bivouacs in the construction site or in houses rented by the employers. On the other hand, the remaining migrant workforce from Tamil Nadu in the construction sector was more stable in their residence. They have been here for the past 12-15 years, but most of them stay in groups of 10-12 in rented houses, and take a break to return to the native villages during the severe monsoon period. They are now in the age range of 30-50 and earn a higher wage rate between Rs. 350-400 per day. The investment in the construction sector now stretches beyond the remittance capital in the *Parakkadavu* village. This is visible in

the dominance of housing finance in the loans taken even by the agrarian community.

Industries associated with construction

The expansion of construction activities across the board has resulted in rising the demand for sand, stone and clay as raw materials for construction. Stone quarrying has especially intensified with a diversified product range of building stone, broken stone, crushed metal, quarry sand, paving tiles and cement and hollow bricks. The major part of the quarry products feed the growing demand for construction material in the metropolitan city of Kochi and its suburbs, apart from the local consumption. At present there are around 40 stone quarries in *Parakkadavu* village located in the hilly regions of *Mambra* and *Puliyanam*. Quarrying in these hills started around 50 years back. The quarries operate on private lands with around 200 acres of land under active and defunct quarries. The nature of jobs in a quarry is of four types: drilling, blasting, stone splitting, loading. Of these, loading is undertaken by migrant labourers on contract. Early methods centered on the use of hand tools such as hammers, manual drills, chisels and wedges. In the early years involving manual operation, the quarries yielded only an average of 10 loads of stone per day. The entire quarry workforce consisted of the local population then.

In the 1990s, with increased demand for building stones, mechanised forms of drilling using diesel powered hydraulic hammers started. The yield from quarries, consequently, increased dramatically to around 100 loads of stone per day from each quarry. With increases in the stone yield, and the changed nature of work, the local workforce slowly started receding from quarry work. With the increase in the quantum of quarry products, transport sector emerged as a major means of livelihoods for the local population. Similar to what occurred in the construction sector, by the mid-1990s, migrant labourers from Tamil Nadu replaced the local workers in the quarries, and catered to the increased demand for labour. By 2005, migrant labourers from North and North Eastern states of West Bengal and Odisha started coming into the *Mambra* and *Puliyanam* quarries, and have now almost completely replaced labour from other states. They learn the work after coming to the quarries,

and are highly transient in their nature, rarely sticking to one quarry for more than a year. Around 1200 workers are found employed in the stone quarries of which only around 400 are local workers. Around 800 quarry workers are from Odisha and West Bengal. Recently some of these migrants have started bringing in families, in which case both husband and wife are employed in the quarries.

Now, the construction-related manufacturing units of clay tiles and brick kilns in the village are completely dependent on migrant labour as well. The tile factories employ Odia and Assamese men as labourers, who are of a younger age group of 16-18, and earn a lower wage rate. Only a few local women are employed at these tile factories for casual work and as managerial staff. The village now has only a couple of active brick kilns due to public opposition against clay mining from paddy fields. Each of these kilns employs around 350-400 seasonal migrants from Tamil Nadu brought in as families by labour contractors for the period of December-May every year. The carpentry units, though a traditionally caste-based manufacturing sector, have also started bringing in labourers from other states. There is a process at work here whereby the unskilled or semi-skilled migrant labourers are slowly learning and venturing into skilled work arenas. Other construction material sourcing activities have emerged following the reduced availability of river sand. These activities include sand mining from the paddy fields, and the manufacturing of sand by washing, crushing and sieving of soft rocks. These activities also employ migrant labour.

The migrant labourers employed in these construction related industries stay in rented houses arranged by the employers or in labour shacks built for the purpose of housing them in large groups of 50-100. The latter arrangement is mostly used for housing seasonal brick kiln labourers. None of the migrants have resident status in the village, and the local self-governance body of the panchayat has absolutely no records as to the number of migrants that are present in the panchayat. The migrant labourers depend on the open market for all their consumption needs ranging from food to medicine.

The predominance of such transient migrant labour for the extraction of natural resources can also be observed in the

other low and midland regions of the Chalakudy basin, and in the adjoining basins of Periyar and Karuvannur. In the midland zone of the Periyar River Basin, at the foot of the Western Ghats, there are several plywood factories employing thousands of migrant labourers. The brick kilns and tile factories dependent on the fertile clay base of the lowland zone of Chalakudy and Karuvannur basins also utilise migrant labour. The extraction and conversion of natural resources of river basins in Kerala, therefore, is found to be predominantly mediated by migrant population groups. The existing laws in the state do not have any provisions to consider the migrant labourers coming on their own through social networks. Even the stipulation about labour contractors recruiting migrant labour requiring a license is rarely enforced. Therefore, neither the state government nor the Local Self Governance body has any reliable records as to the number of in-migrants in a locality. Such a large, highly transient, migrant workforce has no rights over the resources of the region in the extraction of which they play a vital role. Although this workforce redefines linkages to the resources within river basins transcending the conventional notions of rights, stakes and ownership, it is largely invisible in all contemporary planning processes.

5. Implications for stakeholder concerns in river basin management

In practice, natural resource management systems tend to focus on the resource users, while in effect, there are other invisible stakeholders affected by the resource system. The actors within a river basin who are involved in service provisioning are always found to be largely excluded from the fold of stakeholders. The migrant labourers acquire added relevance due to their huge presence in resource mobilisation. The status-quo of a win-win situation, where the local economy is prospering due to the presence of migrants both as labourers and consumers, while the migrants are benefiting by higher wage rates, is transforming to acquire new dimensions in the face of shortage of resources, and the resultant impacts on living conditions.

There are widespread popular protests against the unregulated exploitation of natural resources which is changing the local landscape and ecological features irrevocably in various

regions of the state. In such a situation, where river basins become contested spaces, a complex set of processes that reflect power relations between the in-migrants and the locals are set in motion. This is especially significant as despite their huge presence, the important services rendered by these in-migrants, and their importance as consumers in local economies, migrants are extremely vulnerable in the host spaces. They have been rightly described as the 'quintessential social outsiders, the feared, despised or degraded others' (Kerr 2007). Surabhi and Kumar (2007) point out that there are reports of widespread violation of human rights, imputed criminality, alleged Maoist connections, and a tendency to brand the in-migrants as 'unreliable outsiders' in many places in Kerala. They caution that if the large volume and diversity of the migrant population is not taken into account in the future planning programmes of the state, it can lead to violent social unrest.

In *Parakkadavu*, the local populace has already started voicing concerns and protests against the rampant mining activities jeopardising their land and water security. The environmental impacts of these activities are now much more evident, and are recognised by the public. This increases the chances of confrontations with the migrant labour force as they are the ones directly involved in these processes. The invisible people in the government records may become the only visible target in such confrontations. Already such situations are manifesting in various parts of the state. For example, in the *Erayamkudy* paddy fields of *Annamanada* village in the Chalakudy river basin, migrant labourers were the first to face the brunt of a public protest against brick kilns in the area.

Barham (2001) had expressed concerns that it is highly possible that existing inequalities can get reinforced or amplified when responsibilities for planning and implementation are shifted to new institutional arrangements such as river basin organisations. This becomes relevant in the case of migrants as these are people directly involved in resource extraction with no rights over these resources. Even minimum and basic rights such as clean and safe drinking water, hygienic living conditions, and safety at the work place are mostly not a concern for employers despite the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act (1979), which is

intended to regulate and to provide for the conditions of service of interstate migrant workers.

The state also rarely ensures or enforces the well-being of migrant labour by enforcing mandatory welfare mechanisms. Their vulnerabilities are aggravated by the language barriers, lack of time, lack of awareness, education and the absolute absence of any form of political or trade union support. These migrant labourers are severely underrepresented within all the existing institutional arrangements. They are barely considered in policy making processes in their home states and in the state in which they work. The extreme mobility of these people, and lack of resident status in the place of work lead to a loss of entitlements such as coverage by the Public Distribution System and health insurance schemes.

Further, below the district level, there is a no data or documentation on the number, type or state(s) of origin of the migrant labourers. Even the welfare schemes for migrant workers introduced by the state of Kerala in May, 2010 titled 'Inter State Migrant Workers Welfare Scheme' registers only those labourers who already have an identity proof, and requires certification by employers that the worker is working with them. This effectively cuts off a large chunk of the migrant workforce from getting enrolled due to lack of any identity cards, employers' unwillingness to vouch for them, and the lack of permanent employment itself for many (Kumar 2011). As is seen from the study at *Parakkadavu*, even the local self-governance bodies are yet to acknowledge the emergent issues of governance that such a huge presence of migrant workforce engenders.

6. Conclusion

With the emergence of various non-agrarian activities that have redefined the linkages of people with land, and land with water, river basins need to be revisited from the perspective of these emergent livelihoods and the resultant resource use scenarios. These non-farm livelihood options have brought in their own patterns of local and migrant labour deployment and redefined linkages to the resources of land and water within the basin. In the state of Kerala, the emergence and the flourishing of construction and the associated sectors has transformed the livelihoods

options of the residents, and has increased employment of in-migrant labour. The floating character of these migrant workers, lack of data or documentation, underrepresentation in any of the existing governance structures of the state, resultant omission from any entitlements, and the exclusion from all other institutions including trade unions and political parties make the migrant workforce truly invisible. Migrants remain on the periphery of society, with few citizenship rights, and no political voice in shaping decisions that impact their lives. Exclusion of these important actors may lead to manifold issues in the future, with increased pressure over the basin resources related to demand, utilisation and conservation.

In the context of extraction of natural resources in river basins with the use of transient, migrant labour force, the stewardship possibilities in a river basin become complex and requires serious attention. The rising demand for natural resources such as clay, sand and stone in the construction sector has resulted in increasing the mining of these resources to unprecedented levels. The environmental impact of these activities has given rise to public protests and government regulations against these one-time concentrated natural resource extractions. River basin level planning of natural resources has scope for addressing these concerns under a single umbrella. India is moving towards river basin level planning of natural resources. This process of planning, to be complete and meaningful, has to incorporate emerging trends in occupational patterns that govern resource use and mobilisation at the level of the basin. The undeniable reality of a burgeoning migrant labour force that is absolutely invisible in the existing planning perspectives needs to be grappled with seriously for such a process of planning to be broad-based and equitable.

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Notes on contributors

Madhusoodhanan C.G. is a research scholar at Indian Institute of Technology, Bombay, and is pursing research on the hydrological impacts of climate change in the Western Ghats. He has been working in the water sector for the last 15 years, and has published articles and books in the field. His major contributions include a case study in an edited volume of 63 case studies of water conflicts in India titled "Water Conflicts in India: A Million Revolts in the Making", and a couple of coauthored books titled "Tragedy of Commons: The Kerala Experience in River linking" and "The Mullaperiyar Conflict". He has also published papers in international journals. He is a member of the International Association of Hydrological Sciences (IAHS), and the Institution of Engineers (India). He has been involved in the design, planning and implementation of community level micro-hydropower projects in various parts of the country. His contributions in the field of energy have been recognised by the Indian Business Club at Massachusetts Institute of Technology (MIT), USA through the Global Indus Technovators Award, 2003.

Romesh Chander, with degrees from JNU, is presently Associate Professor in Geography in Kullu, Himachal Pradesh. He has over 20 years of experience of working on tourism, its impacts and on sustainability issues. Presently his area of study is tourism and its environmental impact, and livelihood strategies adopted by the natives of Kullu valley.

T.I. Eldho is a professor and faculty member at the Department of Civil Engineering, IIT Bombay. He has Ph.D. and M. Tech. Degrees in Civil Engineering, both from IIT Bombay, and a B. Tech. in Civil Engineering from Mahatma Gandhi University, Kottayam, Kerala. His areas and interests of research include groundwater flow and pollution, computational fluid dynamics, coastal hydrodynamics, watershed management and watershed modelling, GIS and remote sensing applications in water resources, environmental engineering, environmental impact assessment, and hydro-informatics. He has published a large number of articles in national and international publications.

Arti Gupta has spent 20 years working on environmental issues in the mountain state of Himachal Pradesh. In 2005-2006 she helped form PRAKRITI (A society for sustainable development) working at the grassroots level on environmental issues. She has been a consultant on environmental education for publishing houses like Pearson Longman and Ratna Sagar, and for TERI Press for their 'Soldiers of the Earth' campaign. For the past few years, she has helped coordinate TERI educational initiatives and WWF- India programmes in the state of Himachal Pradesh. Presently she heads the WWF-India State office in Himachal Pradesh.

S. Janakarajan, an economist, currently a Professorial Associate at the Madras Institute of Development Studies (MIDS), Adyar, Chennai, obtained his PhD from MIDS. He has done his Post-Doctoral work at Cornell University, USA, and subsequently has been a Visiting Fellow at the International Development Centre, Oxford University, UK. He is also a Professorial Associate at the Center for Water and Development, SOAS, UK and the President of South Asia Consortium for Interdisciplinary Water Studies (SaciWATERs), Hyderabad, India. He has published several books and many papers in national and international journals.

K.J. Joy has an MSW from TISS, Mumbai. He has been an activist-researcher for more than twenty years. His focus has been on people's institutions for natural resource management at the grassroots and policy levels. His other areas of interests include droughts and drought-proofing, participatory irrigation management, river basin management, watershed-based development, water conflicts, and people's movements. He has worked with Bharat Gyan Vigyan Samithi (BGVS), New Delhi in the areas of watershed development and resource literacy programmes. He was a Visiting Fellow with CISED, Bangalore for a year. He has also been a Fulbright Fellow with the University of California at Berkeley. He has many articles and books to his credit. His latest book is a coedited volume titled, 'Water Conflicts in India: A Million Revolts in the Making'.

Smita Mishra-Panda, a PhD from Asian Institute for Technology (AIT), Bangkok, is presently Professor and Director, Research at the Centurion University, Bhubaneswar. Formerly, she was a faculty member in the Institute for Rural Management

(IRMA), Anand for eight years. Smita has been a researcher at AIT, Bangkok and at United Nations Centre for Regional Development (UNCRD), Japan. She has been a visiting faculty at the Norwegian University of Science and Technology (NTNU), Norway and the Monash Asia Institute, Monash University, Australia. Smita has also worked with Human Development Foundation, Bhubaneswar as a faculty member. Apart from being an academician of repute, she is a well-known face in the development sector in India. She has been the Coordinator for Cap-Net, India - a UN-led process for capacity building and networking around Integrated Water Resources Management (IWRM). She has also been involved with Gender and Water Alliance, Eastern Zonal Water Partnerships for Eastern India as well as the North-East. Gender mainstreaming, natural resource management (water and forests), tribal livelihoods and governance have been some of her main areas of specialisation. Widely traveled, Smita has many publications to her credit.

N. Shantha Mohan currently works as an independent consultant for international and national agencies in the areas of women's rights, gender and the water sector. She was a professor at the National Institute of Advanced Studies (NIAS), Bangalore. She anchored the Water Programme at the institute where the focus of her work was to understand water conflicts in India from a multi-disciplinary perspective. As a part of the work of this programme, she established Zonal Water Partnerships across the country, and the Women and Water Partnership to address concerns relating to the water sector. Prior to this, she headed the Gender Studies unit of the institute which addressed gender issues from a rights and social justice perspective. Before joining NIAS, she worked as an Assistant Professor at ISEC, Bangalore, as a Faculty at the R.V. Teachers College, Bangalore, and as a Research Associate at the Joint Women's Programme (WCSRCCISRS), Bangalore. She has also served as a Gender Expert for the Indo-Dutch Tungabhadra Irrigation Pilot Project. She did her doctoral work at ISEC, Bangalore, and received her PhD degree in Education from the University of Mysore. She is the coeditor of the volume titled 'River water sharing: transboundary conflict and cooperation in India' published by Routledge. She has also published several books, book chapters, and articles in national and international journals. Her

research interests lie in developing conceptual frameworks and methodologies in gender studies and in the water sector.

Anil D. Mohile has degrees in Civil Engineering and Water Resources Development from the Universities of Bombay and Roorkee (Now IIT, Roorkee). He worked briefly for the Government of Maharashtra, and, then mostly for the Government of India. He has played an important role in India's water sector through his contributions in his roles as the Director, Chief Engineer and Member of Central Water Commission, as the Director General of National Water Development Authority, Chairman of the Brahmaputra Board, etc. In the year 2000, he retired from his position as the Chairman of Central Water Commission and ex-officio Secretary to Government of India. After retirement he has worked on assignments for World Bank, Asian Development Bank, International Commission on Irrigation and Drainage, International Water Management Institute, Government of India, State Governments of Gujarat, Maharashtra, Odisha, and for leading Consultants such as WAPCOS, Mott McDonald, SNC Lavlin. He also works as an arbitrator. He has served professional organisations in various capacities such as the President of the Indian Association of Hydrologists, and as the Vice-President of the Indian Water Resources Society. He has written and published a large number of papers on relevant subjects. His main focus areas of work and interest have been hydrology, water planning and assessment, water policy, and water conflict resolution.

Hippu Salk Kristle Nathan is an Assistant Professor in the Energy and Environment Policy Programme at NIAS, Bangalore. He has an M. Tech. degree in Thermal Engineering from Indian Institute of Technology, Delhi, and a Ph.D. in Development Studies from Indira Gandhi Institute of Development Research(IGIDR), Mumbai. Prior to getting enrolled in the doctoral programme at IGIDR, he worked as a software professional at Infosys Limited, Bangalore and at Geometric Global, Mumbai. As a part of civil society interventions through Peoples Foundation for Scientific Socio Economic Development (PeFSSED), he has been involved in issues related to education, health, and livelihoods in urban slums and remote villages of Maharashtra, Odisha, and Uttar Pradesh. Nathan is one of the winners in the GDN Awards and Medals Competition 2013 in the category of 'Outstanding

Research on Development'. He is a recipient of Young Scientist Award conferred at Odisha Environment Congress – 2012. As a doctoral student, his research papers have received 'best paper award' in four colloquiums, namely, SCODER-2007 (IGIDR, Mumbai), COSMAR-2007, COSMAR-2008 (IISc, Bangalore), and Doctoral Colloquim-2010 (IIM, Ahmedabad). His research interests are in the areas of economic measurement, energy, water, human development, disarmament, world peace, sociopolitical reforms, and sustainable use of resources.

Tapan Padhi presently leads the National Institute for Development (NID) - a trust mandated to work on integrated natural resources management for all-round development of lives and livelihoods. Prior to this he led the water programme unit 'Centre for Water for Life' at RCDC (a leading NGO of Odisha) for four years since its inception. Mr. Padhi was one of the founding members of RCDC, and worked in different capacities in the organisation for well over a decade. He also led RCDC as Executive Director from 2004 to 2007. He has been responsible for mainstreaming water related discourse in Odisha's civil society and mass media. He began his professional career as a journalist in Eastern Media Limited, publishers of leading Odia daily 'The Sambad'. He has edited 'Nandira' (both English and Odia versions) - a newsletter on industrial pollution; 'Ama Jangala Amara' - a quarterly Odia newsletter on community forestry initiatives in the state; 'Community Forestry' - a journal in English on community forestry in India; 'Waterwise' - a bimonthly electronic newsletter in English on issues related to water and 'Jala Jeeban Sambad' - a quarterly Odia newsletter on water in Odisha. He has several other publications to his credit.

Suhas Paranjape is a B. Tech (Chem) from Indian Institute of Technology, Bombay. He has participated in various movements such as the People's Science Movement, and the movement of adivasi agricultural labourers. He has also been a part of many action research studies and pilot projects undertaken by Centre for Applied Systems Analysis in Development (CASAD), and the Society for Promoting People's Participation in Ecosystem Management (SOPPECOM), Pune. His areas of interests lie in the fields of participatory management of natural resources especially in the field of participatory irrigation management. For three years from 1996 to 1999 he worked as a core team

member of Bharat Gyan Vigyan Samiti (BGVS) in its watershed development project across the country. He was a Visiting Fellow with CISED, Bangalore for a year. He has many articles and books to his credit, the latest of which is the coedited volume with K.J. Joy titled 'Water Conflicts in India: A Million Revolts in the Making'.

Srikant Patibandla has a doctoral degree from Institute for Social and Economic Change (ISEC), Bangalore. He worked on the topic 'Reconceptualising Rights: A Study of Micro Social Movements in India', and was awarded his PhD degree in Political Science in the year 2011. He did his Masters in Politics and International Relations from Pondicherry University, Pondicherry, and did his M. Phil from School of International Studies (SIS), Jawaharlal Nehru University (JNU), New Delhi. He has taught postgraduate courses for three years at the Department of Political Science, Pondicherry University, before moving to ISEC for his PhD. Later he worked at Public Affairs Centre (PAC), Bangalore, as Programme Officer, and was involved in citizen-based activities such as promoting social audits, social accountability, monitoring, *etc*., by educating and empowering communities. After around four years of work at PAC, he moved to Guntur, his hometown in Andhra Pradesh, and is currently involved in research and consultancy activities. His research interests include grassroots politics, social movements and rights. He was awarded the ICSSR institutional scholarship for his doctoral work at ISEC. He has also participated in the Workshop of Young Scholars from the Global South (WYSGS), held at Geneva, Switzerland by Graduate Institute of International and Development Studies, Geneva, for the year 2007.

Sailen Routray currently works as a Visiting Faculty at Azim Premji University (APU), Bangalore, and is associated with the Centre for Human Sciences Bhubaneswar. He also works as an independent consultant in the areas of natural resource management and social development. His previous appointments include working as 'Deputy Director (Academics)' at Kalinga Institute of Social Sciences, Bhubaneswar, as 'Senior Lecturer' at APU, Bangalore, and as 'Research Associate' and 'Research Assistant' at TISS, Mumbai. He did his doctoral work at NIAS, Bangalore, and obtained his PhD in Development Studies from the University of Mysore. He has an MA in

Social Work (TISS, Mumbai), and a B.A.(honours) in English Literature (Utkal University, Bhubaneswar).While he was a PhD student at NIAS, he was also involved in the work of the Water Programme of the institute. He is the coeditor of the volume titled 'River water sharing: transboundary conflict and cooperation in India' published by Routledge. Apart from this, he has three other books (of translations into Odia) to his credit, including the translation of the alternative education classic 'Deschooling Society' by Ivan Illich. He has also published chapters in books by publishers such as Routledge, MacMillan, Academic Foundation and CSDS. He has written and reviewed for academic journals. He also writes in English and Odia for non-academic periodicals, and is a practising translator between Odia and English. His teaching and research interests lie in the areas of 'Anthropology of development, governance, and public policy', 'Anthropology of the everyday state', 'Natural resource management', 'Contemporary history of Odisha', and 'Sociology of India'.

Varun Sharma has an MSW degree from TISS, Mumbai. He has been associated with grassroots organisations working in the fields of social education, watershed management, and ecological security, and has eight years of experience of working on these issues. He has completed his MPhil from the Department of Social Work, Delhi University. His thesis 'Sciences in the woods: of tigers, tribals and misfits' deals with the collaborating links between wildlife history and conservation science in contemporary society. Using a poststructuralist framework and borrowing from the works of Michel Foucault, it dwells on the construction of certain animals as 'endangered' to the exclusion of others. Varun is interested in the nature of public debates on environmental issues, the manner in which people take sides, and how ideas of an inviolable nature are forged through such social processes. He has interests in environmental history and colonial historiographies on crime and criminality. In more recent times he has taught at the Department of Social Work, University of Delhi. He is currently pursuing his PhD at the Department. In his doctoral project he is trying to study the interrelations between ideas of crime, surveillance and tropical nature for a National Park in north-east India within the disciplinary framework of historical anthropology.

P.K. Shetty is a Professor at National Institute of Advanced Studies (NIAS), Bangalore. He received his PhD from Indian Agricultural Research Institute, New Delhi. Earlier, he headed the Environmental Studies Unit, and has served as Dean of the School of Natural Sciences and Engineering and the Dean (Administration) at NIAS. He has also served as the Vice-President of the Society of Pesticide Science, India. He is a committed educationist and policy analyst, and has carried out research and in-depth analysis in multidisciplinary areas. He has published seven books, contributed to numerous book chapters, highly cited peer-reviewed research papers, reports and articles. He has successfully completed several research projects of societal significance, both at regional and national levels. He also conducts regular farmers' field visits and trainings in Karnataka, Kerala, Tamil Nadu and in other Indian states. He has visited a number of countries as part of his professional work, and is a frequently invited speaker at various professional fora in India and abroad. He has received several awards in recognition of his work including the prestigious Karnataka State Rajyostava Award (2007) from Government of Karnataka, and the Kempe Gowda Award (2011) from Bruhat Bangalore Mahanagara Palike, Government of Karnataka.

K.G. Sreeja is presently a postdoctoral fellow at the Department of Civil Engineering, IIT Bombay. Her research area is agro-ecology, wherein her specific interest lies in understanding the multiple and dynamic linkages between agriculture, natural resources, livelihoods and governance. Her postdoctoral work involves an interdisciplinary assessment of climate change and land-use change impacts on agricultural systems in the Western Ghats. Her PhD research at NIAS, Bangalore, focused on conceptualising river basins as socio-ecological spaces; it also looked at social processes involved in natural resource use and management, and the emergent forms of institutions, within and beyond river basins, in natural resource governance in the Western Ghats. She has published articles in international journals and edited volumes on various aspects of agriculture and natural resource management.

Jayasree Vaidyanathan is presently with People Foundation for Scientific Socio-Economic Development, Mumbai as a Project

consultant. Jayasree is a meteorologist with specialisation in Hydrometeorology. She has masters and doctoral degrees in Meteorology from Cochin University of Science and Technology. Jayasree's research interests are in the areas of hydrometeorology, water resource analysis and management, flood mapping, 'water, sanitation, and hygiene' (WaSH), and remote sensing and geographic information systems. After her Ph.D., Jayasree has worked with corporates and research organisations. Her post-doctoral research at Centre for Inter-disciplinary Studies in Environment and Development (CISED), Bangalore was on the topic: "Influence of forest cover changes on hydrological functions of various river catchments across Karnataka and Kerala". Later, she worked as a Project Scientist at Technology Informatics Design Endeavour, a Bangalore based NGO, where she handled a DST-sponsored project on assessing the impact of man-made changes on water resources of a river in Karnataka. She has also worked as Hydrology-GIS consultant with Winrock International, New Delhi, with the Institute of Social and Economic Transition, USA, and as Wind energy specialist with CCES-Global, USA. In her most recent engagement, at National Institute of Advanced Studies, Bangalore, she worked on a project entitled "Social Technological solutions to major water challenges in India".

Most academic work on water and water conflicts in India has narrow thematic and sectoral foci; the linkages across sectors and themes are generally not drawn. This edited volume fills an important gap by bringing together scholars from various disciplines to look at water conflicts with an approach that is simultaneously collaborative and interdisciplinary. It is the result of a two-day consultation organised at NIAS by the institute's 'Water Programme' on 15th and 16th of March in 2010 held to bring together academics and practitioners from India, with a variety of disciplinary and regional backgrounds, to discuss and understand the issues surrounding intersectoral and interstate water sharing and conflicts (and their possible relationships) from a multidisciplinary perspective.The chapters contained in this volume bring perspectives from across India by featuring conflicts from states as different from each other as Kerala, Odisha, Maharashtra, Andhra Pradesh, Tamil Nadu, and Himachal Pradesh.

The contributing authors of the present edited volume map the contours of conflicts surrounding water in India by pluralising the frames within which these can be located. They bring in perspectives from multiple vantage points to give us a map of the dynamics behind such conflicts. Some conflicts surrounding water are a legacy of history; some other conflicts stem from inappropriate policies; quite a few arise and do not get resolved due to the lack of appropriate dispute resolution mechanisms; a few others involve stakeholders that stay invisible and need to be visibilised. The papers of this edited volume address these issues, and help us take a more nuanced and multi-disciplinary view of water conflicts in India.

Contributors: Sailen Routray | N. Shantha Mohan | Varun Sharma | K. J. Joy | Suhas Paranjape | Patibandla Srikant | S. Janakarajan | Madhusoodhanan C.G. | K.G. Sreeja | T.I. Eldho | P.K. Shetty | Arti Gupta | Romesh Chander | Anil D. Mohile | Tapan Padhi | Hippu Salk Kristle Nathan | Jayasree V | Smita Mishra-Panda

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National Institute of Advanced Studies
IISc Campus
Bangalore-560012

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