

WASSA Project Reports, Volume 2:

WATER SHARING CONFLICTS WITHIN COUNTRIES, AND POSSIBLE SOLUTIONS

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Project on “Water and Security in South Asia” (WASSA)

A Project Sponsored by the Carnegie Corporation of New York

And Implemented by the

*South Asia Program / FPI, School of Advanced International Studies (SAIS),
Johns Hopkins University, Washington, D. C.*

And

*Global Environment and Energy in the 21st Century (GEE-21),
Honolulu, Hawaii*

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*The views expressed herein do not necessarily represent those of the U. S. Government.

PREFACE

More than 1.3 billion people live in South Asia. Almost half of these depend on river systems for their water needs. Many of these major rivers, some of which are amongst the world's largest, flow across national borders and have been a source of tension in the region. At times, when the snow melts in the Himalayas, or during the monsoon, there is too much water, and frequent floods. At other times, there is too little water available, and intense competition for it arises between countries, and between upstream and downstream provinces or states even within the same country.

In the western part of the sub-continent, the waters of the Indus basin are shared by Pakistan and India. In the North and Northeast, the basins of the Ganges, Brahmaputra, and Meghna are shared by India, Nepal, Bhutan, and Bangladesh, and in some areas by China. Although some arrangements presently exist to share the waters between the respective countries, their implementation has not always been satisfactory, and there is a widespread perception that these arrangements could be inadequate in times of increased water scarcity.

There are also disputes within India and within Pakistan regarding the equitable distribution of water between the states or provinces. As the populations of the countries increase, and water availability declines, tensions over water rights are likely to increase as well.

The project on "Water and Security in South Asia" focuses on the critical issues mentioned above. It has several goals:

- Identification of the key issues regarding water resources in the subcontinent;
- An examination of the provisions of the Indus Water Treaty of 1960 between India and Pakistan, and the other water Treaties or Agreements critical to the region;

- Identifying approaches to water conflict issues within and between the countries of South Asia that could be used throughout the region;
- Examining some of the climate change and investment aspects of water availability that could affect the future availability of water in the region.

The Carnegie Corporation of New York has identified water availability as a priority area for its Program. In his report to the Board of the Corporation, President Vartan Gregorian has pointed out that “Much less heed is being given to the most basic human need ---- water. In 1996, the United Nations Development Programme reported that there were ten countries in the world, largely in Africa, where more than half the population did not have access to potable water. The sharing of water resources has the potential of bringing rival nations together in common cause, just as the manipulation of the water supply by those who control it can lead to conflict and violence, as we already see in the Middle East and could witness in Asia and Africa”. In keeping with this priority, the Carnegie Corporation of New York provided the funding for the WASSA project.

Issues relating to a resource as critical as water can obviously only be negotiated by the various governments themselves. Projects like WASSA could make several important contributions such as:

- Highlight the issues through a regional prism;
- Offer constructive alternatives to conflict in addressing the critical issue of water, whereas governments in the subcontinent have largely tended to focus on these issues in the shadow of conflict;
- Create a joint stake in the solution of issues relating to water through creative thinking on future actions by experts who understand the political world that shapes decisions;
- Deal with questions of trust which influences the entire range of water as well as other important issues in South Asia;
- Create conditions for cooperation through the development of a network of technical experts placed to make a difference with their respective governments.

Water Sharing Conflicts Within Countries

Teams consisting of persons from Bangladesh, India, Nepal, and Pakistan have prepared the reports of the WASSA project. Consultants based in South Asia, Japan and the USA have provided additional input. The participants met several times during the project in working groups as well as in Workshops for the whole team.

The project work has been carried out under the following themes:

- Gaps between water demand and supply;
- Approaches to meeting the gaps;
- Water sharing conflicts within countries and possible solutions;
- Water sharing conflicts between countries and possible solutions;
- Possible impacts of global climate change on water availability;
- Investment requirements for enhancing water supply.

Participants from each of the following organizations (and in one case, two eminent consultants) have taken the lead on one of the above topics, and have provided input in other areas:

- Bangladesh Unnayan Parishad (BUP);
- Economic Development Consultants (EDC), Pakistan;
- Jalsrot Vikas Sanstha (JVS), Nepal;
- Nepal Water Conservation Foundation (NWCF);
- Pakistan Institute for Environment-Development Action Research (PIEDAR);
- Trust for Water, Environment and Development Studies (TWEDS), Bangladesh;
- Water and Power Consultancy Services (I) (WAPCOS), India;
- Dr. M. S. Reddy and Mr. N. V. V. Char, India.

Dr. James E. Nickum (TJK College, Japan), Dr. Murari Lal (India), Dr. Amir Muhammed (Pakistan), Mr. P. B. Shrestha and Dr. H. M. Shrestha (Nepal), and Mr. George Verghese (India) have made valuable contributions to individual volumes.

Although we have listed the participating organizations above, the views expressed in this and other reports of the WASSA project are those of the individual authors, and not necessarily those of their organizations. In most cases, the views expressed in the Reports reflect those of all the authors of that Report. In a few cases, the authors had differing opinions that have been identified as such.

Distinguished persons with close links to policymakers in the four countries are serving as Policy Advisors for the project. They are:

- Major-General Mahmud Durrani (Pakistan), former Chairman, Pakistan Ordnance Factories Board;
- Mr. Salman Haidar (India), former Foreign Secretary, Government of India;
- Mr. Farooq Sobhan (Bangladesh), former Foreign Secretary, Bangladesh;
- Ambassador Bhekh Thapa (Nepal), Ambassador of Nepal to India.

The Policy Advisors have given generously of their time and provided valuable input. The authors of the project reports have incorporated this input in the Final Reports, which have been printed in three volumes, covering the following major themes:

1. Water Demand-Supply Gaps and Approaches to Closing the Gaps;
2. Water Conflicts *within* Countries, and Approaches to resolving them;
3. Water Conflicts *between* Countries, and Approaches to resolving them;

The Final Drafts of the volumes were reviewed by water resource specialists not associated with the WASSA project. Input received from them, as well as from the project Conferences held in Islamabad in February 2003 and in New Delhi in September 2003, has been incorporated in the Final Reports. In addition, a comprehensive Executive Summary has been prepared. Some of the individual reports can be downloaded from the GEE-21 web site.

Toufiq A. Siddiqi and Shirin Tahir-Kheli

Project Coordinators

November 2003

Acknowledgements

We would like to thank the Carnegie Corporation of New York, its President Vartan Gregorian, and Senior Program Officer Stephen Del Rosso for their continuing support of the project on “Water and Security in South Asia”. We are grateful to all the authors for their cooperation with each other and with the project coordinators during the lengthy period of three years. We especially appreciate the willingness shown by the coordinating authors of each volume --- Dr. M.S. Reddy and Mr. N. V. V. Char for volume 1, Mr. Ayub Qutub for volume 2, and Dr. Umesh Parajuli for volume 3, to incorporate the input received from the project advisers, external reviewers, and from other stakeholders during the project workshops and conferences.

It is a pleasure to thank the policy advisors --- Mr. Farooq Sobhan (Bangladesh), Mr. Salman Haidar (India), Ambassador Bhekh Thapa (Nepal), and Maj.-Gen. (ret.) Mahmud Durrani (Pakistan) for their valuable input and advice throughout the project.

Crucial support during the preparation of the several Drafts of the Reports was provided by Ms. Ulrike Siddiqi and Ms. Amy Funk of GEE-21. Dr. Q. K. Ahmad and the staff of Bangladesh Unnayan Parishad made excellent arrangements for the project workshop in Dhaka, as did Mr. Ayub Qutub and the staff of PIEDAR for the Conference in Islamabad. We are grateful to Dr. Thomas Keaney, Ms. Courtney Mata, Ms. Nilofer Afridi-Qazi, and other staff members at FPI/SAIS for organizing so well the Policy Briefing held in Washington, D.C., and to Mr. R. K. Mishra and the staff of the Observer Research Foundation for graciously hosting the project Conference in New Delhi in September 2003.

Toufiq A. Siddiqi and Shirin Tahir-Kheli, *Project Coordinators*
November 2003

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INTRODUCTION

Water and security are both much-studied subjects, characterized by evolved and sophisticated concepts and traditions of debate. The relationship between the two has not been explored as extensively, however. In this paper, we focus on water sharing conflicts within the four South Asian countries that are part of the WASSA project. The aim is to understand how laws, rights, administrative procedures and customary practices for water sharing within Bangladesh, India, Nepal and Pakistan have enhanced or retarded the livelihoods and security of water users in various economic sectors across the States, Provinces, or regions of these countries, and what might be undertaken to improve the situation.

This draft report has two parts, (i) a thematic part and (ii) case studies. The thematic part is organized into six substantive chapters, starting with a chapter that outlines our approach to the water-security nexus. Next we review the evolving world context of ideas, laws and conventions, and practices from which no country is immune. Specifically, it comprises a survey of the human security debate, water law and rights, and models of integrated river basin management. Administrative procedures and customs across South Asia provide a more immediate context for national water users. Changes or lack of them in water policies and laws, decay or turnaround in management provide the backdrop for impasse or constructive resolution of conflicts.

Equipped with information about the global and national contexts, we address the key issues underlying State or provincial conflicts, and conflicts between sectors and users in the South Asian countries. We undertake an analysis of the conflicts and emerge with some lessons and recommendations. For readers seeking more details about sub-national water conflicts, descriptions and different viewpoints are presented in the case studies.

A three-year long process of workshops and sharing of drafts between mainly South Asian water sector researchers has gone into the preparation of this report. Although we are not always in agreement among ourselves as to what constitutes conflict and security

in the context of water sharing between States, provinces, sectors, and people, we have sought to bring together the elaborate yet still evolving concepts in both the water and security debates in order to contribute to the development of fresh, and hopefully more useful, perspectives. We feel that the importance of the topic for sustainable development justifies the effort.

Part I

1. APPROACH

Water security in South Asia involves far more than rivers and aquifers flowing across national boundaries, although that is commonly where the discourse on security stops. In this report we argue that security begins at home, or at least on the farm, and that an investigation of the problems of water sharing within countries, at all scales, sheds light on and in many ways directly impacts transnational water sharing issues. It does so in at least two ways – directly and, we hypothesize, by resonating in a “fractal” way – problems and their solutions tend to replicate themselves at different levels of scale.

Directly, inter-state or inter-provincial conflicts and differences in interest may play an important role in international conflict negotiation. For example, the 1996 agreement between Bangladesh and India over the sharing of the waters of the Ganges (Ganga) resulted in anxious protests from Uttar Pradesh and Bihar. There was a feeling that some kind of embargo would be imposed on the States in the future to restrict lean season utilization in their jurisdictions in order to maintain a certain minimum flow at Farrakka. Similarly, what may seem a wholly internal conflict between Punjab and Sindh in Pakistan, exacerbated by the recent droughts, takes place against a backdrop of accusation that the Indus Waters Treaty of 1960 favored the Punjab against Sindh.

Due to the salience of water issues between the States or Provinces and the consequent availability of information on them, local conflicts may receive less attention. However, conflicts are common at community scales between users and sectors. In this volume, case studies from South Asia illustrate some of the many kinds of local water-related livelihood issues. Insight into the conditions that have led either to constructive engagement and resolution, or to an impasse could be applied to similar situations that occur across South Asia.

Our other argument, more tentative but if true more profound, is that conflicts are fractal (similar in character at all levels), and that solving local conflicts may in many cases be a

more meaningful approach to security than focusing on the international scene. Even if human and water security problems at the local level are not absolutely fractal, addressing them may be the most effective way to reduce tension at higher levels. Indeed, conflicts between larger political entities may often be a way of displacing, denying and projecting more embedded internal differences of interest and power. Conflicts, whether latent or overt, whether of interest, words, or arms, exist between neighbors, no matter how small or big they are. Differences exist, of course – indeed, it seems that conflicts are more likely to be intractable, and even to lead to the shedding of blood, at the local level.

For example, inequities in water availability within watercourses between head, middle and tail end farmers are more acute than imbalances in water supply at provincial or state and canal scales. Subsidized water prices and unaccountable top-down delivery systems make farmers dependent on state irrigation officials, leading to a vicious cycle of bribery, unintended and deliberately induced uncertainty in water supplies, and a further need for individual irrigators to seek special favors from departmental officials. Many maladies, such as application of excessive water to the fields of those with access and excessive investment in private facilities such as deep tube wells, can be attributed to this problem. Water theft, an indicator and cause of conflict, including subsequent litigation or threat of it, takes up considerable time and energy of irrigation farmers.

In spite of the concerns mentioned above, the attention of policy makers remains focused on inter-provincial (or inter-state) disparities, particularly in India and Pakistan, where large river basins cut across State and Provincial boundaries. Is this because of the closed-door small-numbers decision-making process at the top? Is it due to a lack of appreciation of water supply and demand issues at a local scale? Do local disparities aggravate the perceptions of provincial and state deprivation? Or is the focus on the province and state a deliberate strategy of landlords and their departmental interlocutors to draw attention away from local water equity issues? We address the inter-state and inter-provincial, as well as local sector and user conflicts in some detail, framing the problems in a governance perspective.

Water Sharing Conflicts Within Countries

It may be, as some say, that the State is too large a unit to do well the little things (be responsive to local conditions) and too small to do well the big things (river basin management or macroeconomic guidance in a global economy). Therefore new methods of governance are called for, at both small and large scales, to allow the state to focus on those areas that it can and must do, remove itself from other arenas, and establish mutually productive linkages with other actors such as civil society and river basin organizations.

2. AN EVOLVING CONTEXT

Water resources are renewable but finite. Water is getting scarcer per capita with population growth, while development makes more options potentially available; both underlying trends could exacerbate the current conflicts. South Asia is not the only region in the world facing water-sharing conflicts, and it is not immune to emerging ideas, laws and conventions, and models and practices for integrated water management in other parts of the world. In this chapter, we first review this evolving circumstance. Next, we look at the more immediate context of national water laws and administration.

2.1. The Human Security Debate

Not so long ago, before the end of the Cold War, it would have seemed strange to include water-sharing conflicts within countries in a project on security. First and foremost, security was a military concern, and between sovereign states. Other forms of security, such as food security and energy security were also related to the state in relationship to possible adversaries. Recently, security of both states and their citizens against terrorism has come to occupy center stage. “Security” remains a contested and evolving concept (Najam, 2001).

Security studies have increasingly included in their ambit the domestic factors that can lead to destabilization of the national government, and promoted a broader idea of *human security*, which considers the “security of people, not just of territory” (Haq, 1997). A link between the two was provided early on by Ullman (1983), who noted that

A threat to national security is an action or sequence of events that threatens drastically and over a relatively brief period of time to degrade the quality of life for the inhabitants of a state, or threatens significantly to narrow the range of policy choices available to the government of a state or to private, non-governmental entities (persons, groups, corporations) within the state.

In the words of Elliott (2001), the human security paradigm "turns the conventional security aphorism – secure states means secure people – on its head."

Myers (1993) characterized human security in a broad sense:

“... security applies most at the level of the individual citizen. It amounts to human well-being: not only protection from harm and injury but access to water, food, shelter, health, employment, and other basic requisites that are the due of every person on Earth. It is the collectivity of these citizen needs – overall safety and quality of life – that should figure prominently in the nation’s view of security”.

The United Nations Development Program (1994) cited four essential characteristics of human security (Nickum and Oya, 2001):

- a. It is a *universal* concern, threatening the lives of rich as well as poor;
- b. Its various aspects are *interdependent* and their consequences spill over national borders;
- c. *Prevention* is preferable to intervention, from pollution to social breakdown to epidemic disease; and
- d. It focuses on people’s *freedom* to choose.

Suhrke (1999) would add resilience to “sudden crisis-like disruptions” as a characteristic of human security. A lack of resilience may manifest itself as social breakdown or, at the state level, governance or institutional failure (Najam, 2001).

Environmental security, in the sense of protecting individuals and communities from the consequences of environmental decline, is a human security issue. It is the security issue of greatest concern to us here, in particular as it is related to water.

Thomas Homer-Dixon of the University of Toronto (Homer-Dixon and Blitt, 1998) has carried out a large project on the relationship between environmental scarcity and conflict, seeking to identify common physical, economic, and social dynamics in a variety of contexts. His project gathered, evaluated, integrated and disseminated existing data on the possible causal links among population growth, renewable resource scarcities, migration and violent conflict. Pakistan was one of the countries where the case studies were carried out.

Homer-Dixon’s main findings (Gizewski and Homer-Dixon, 1998) may be paraphrased as follows:

Water Sharing Conflicts Within Countries

Direct linkages between environmental scarcity, such as a shortage of fresh water, and conflict are difficult to establish. Scarcity is most likely to produce conflict indirectly, by generating conditions such as poverty, ethnic and religious tensions, and migration that lead to instability. Contextual factors such as the nature of the economic system, levels of education, ethnic cleavages, class divisions, technological and infrastructural capacity, and political legitimacy determine the strength of the linkage between environmental scarcity and destabilizing conditions, as well as the potential for violence.

Powerful groups often take advantage of environmental scarcity to capture valuable resources such as water, reinforcing their power and pushing already marginal groups further into the ecological margins. Both the environment and the society as a whole become less secure and less capable of adapting to scarcity by either using resources more efficiently or by decoupling themselves from their dependence on local resources.

Poor countries are often under-endowed institutionally, with undeveloped markets, incompetent or corrupt governments, and minimal capacity to carry out research on local conditions necessary for escaping the scarcity trap. A failure in social and economic adaptation to environmental scarcity is likely to lead to choke off economic development, weaken the state, and push migrants to other areas, including ill-prepared urban centers and other countries. These factors can give rise to ethnic conflicts, insurgencies and coups, although they are rarely a direct cause of international conflict.

Although inter-state conflict has occurred over non-renewables such as oil and strategic minerals, scarcities of renewable resources rarely cause "resource wars" among states. There are two reasons for this difference. First, in general, states cannot easily or quickly convert renewable resources into assets that significantly augment their power. Second, the very countries that are most dependent on renewable resources, and that are therefore most motivated to seize resources from their neighbors, also tend to be poor, which lessens their capability for aggression.

There is a reasonably plausible scenario linking domestic turmoil and international conflict, however. Civil violence within states can affect external trade relations, cause refugee flows, and produce humanitarian disasters that call upon the military and financial resources of developed countries and international organizations. Moreover, states destabilized by environmental stress may fragment as they become enfeebled, and peripheral regions are seized by renegade authorities and warlords. States might avoid fragmentation by becoming more authoritarian, intolerant of opposition, and militarized. Such regimes, however, sometimes abuse human rights and try to divert attention from domestic grievances by threatening neighboring states.

Wolf (1999) is the other main empirical researcher on transboundary freshwater disputes. His findings differ substantially from those of Homer-Dixon. One of the few common points is that conflict and turmoil related to river water are more often internal than international. The main findings of Wolf (2001) may be paraphrased as follows:

While the potential for paralyzing disputes is especially high in trans-national basins, the record of violence is actually greater within a nation’s boundaries. Tensions have spilled into violence on occasion, generally among ethnic, religious or tribal groups, water use sectors, or states/provinces. While disputes can and do occur at the sub-national level, the human security issue is subtler and more pervasive than violent conflict.

History is rich with examples of how water has become a catalyst to dialogue and cooperation, even among especially contentious riparians. Violence over water seems neither strategically rational, nor hydrologically effective, nor economically viable. Shared interests along a waterway seem to consistently outweigh water’s conflict-inducing characteristics. Furthermore, once cooperative water regimes are established through treaty, they turn out to be impressively resilient over time, even between hostile riparians, and even while conflict is waged over other issues.

The challenge is to get ahead of the ‘crisis curve’ to help develop institutional capacity and a culture of cooperation in advance of costly, time consuming crises that in turn threaten lives, regional stability and ecosystem health. One productive approach has been to examine the benefits in a basin from a multi-resource perspective. This has required riparians to get past looking at water as a commodity to be divided and to develop instead an approach that equitably allocates not the water, but the benefits derived there from.

How can one assign significance to the various dimensions of water related insecurities in view of the sharp debate? One simple measure of water-related insecurity could be the extent of death and disease that could be attributed to a particular factor. By this measure, contaminated water supplies would win hands down as by far the leading cause of insecurity. Worldwide, nearly two million children die each year from diarrhea (over the last decade as many as all war casualties since WWII) mainly in the slums and villages of the South (Water Supply and Sanitation Collaborative Council, Geneva 2002). However, these casualties are not usually the intentional result of conflicts. (Rarely, water sources may be intentionally poisoned). Even human security studies focus on something narrower.

Water Sharing Conflicts Within Countries

There is agreement that wars over river water between upstream and downstream countries are extremely rare, historically. Moreover, in the twenty first Century, they are likely only in a narrow set of circumstances: The downstream country must be highly dependent on the water for its national well-being, the upstream country must be able to restrict the river's flow, there must be a history of antagonism between the two countries, and, most important, the downstream country must be militarily much stronger than the upstream country.

There is also agreement that conflict and turmoil related to river water is more often internal than international. Particular attention has been given in recent years to the relocation of large numbers of often already marginalized people from the sites of dams and other major water projects. Many other important dimensions of internal conflicts remain to be empirically researched.

2.2. Water Law and Conventions

A number of legal doctrines have evolved internationally for surface and, to a lesser extent, for groundwater use rights (United Nations, 1970). These doctrines can apply to individuals, provinces or countries, although the specific terminology varies according to scale.

Sub-national water rights doctrines

At a sub-national level, water rights tend to be tied either to the land or to the time of initial use. In the United States, these are called “riparian” and “prior appropriation” (or “appropriative”) doctrines respectively, and the relative importance of each varies from state to state. Some states, such as Texas, adhere to both in an uneasy compromise.

The riparian doctrine originates in the common law of water-rich England, and is most common in the humid eastern states. Under this doctrine, the owner of land contiguous to a stream has use rights over its water. In its basic form, consumptive use is excluded: the owner is obligated to return water of comparable quantity and quality to the source. Over time, “reasonable use” modifications have often been allowed for consumptive uses such

as irrigation. This doctrine often involves little monitoring or other intervention by third parties such as government, aside from dispute resolution.

The prior appropriation doctrine originated in the mining communities of the arid American west, where water often had to be diverted long distances from its source, and rarely returned. This doctrine accords the users of water rights in the order in which the water was originally withdrawn from the source. In principle, the water has to be put to “beneficial use” to retain the right, but this provision is rarely enforced. Appropriative rights require monitoring and measurement, often by an irrigation district.

Two other doctrines that have evolved are those of the “equitable division of benefits” and the “public interest”. In the United States, for example, the equitable division of interests doctrine was proclaimed by the Supreme Court in *Kansas v. Colorado* (1907) for inter-state waters, although in the end, the waters in that specific controversy were allocated by an inter-state compact of 1949 (Sherow, 1990).

In India, a quasi-federal country, 'the community of interest theory' has been proposed recently in which the basin is considered as a single economic unit irrespective of State boundaries, and waters are vested in the community of co-riparian States, to be utilized to the maximum benefit of all in an integrated manner. This is an idealistic approach. However, it could be a solution in situations where inter-state disputes have been difficult to resolve due to water being a 'State subject'. Empowering the central government, as this theory suggests, could ensure an integrated development of the basin through mechanisms such as River Basin Organizations.

Recently, a “public interest” doctrine has evolved in the United States, primarily to block diversions from water bodies when they cause significant harm to local residents or ecosystems. In particular, the city of Los Angeles was denied the right to deplete Mono Lake. This doctrine requires intervention by a third party with strong enforcement capability.

Water Sharing Conflicts Within Countries

International water rights doctrines

The earliest legal precedents for settlements of river disputes relate to navigational rights in Europe during the seventeenth century. It was only in the nineteenth century, however, when dams were built for storage and diversion of water for irrigation, hydropower, and other uses that formal international cooperation for settling water-sharing conflicts between nations emerged. From the case laws or compacts of these disputes several water-sharing theories have emerged over the years (Guhan, 1993). Basically, four different doctrines have evolved:

1. Internationally, the doctrine of absolute sovereignty combines the worst features of riparian and prior appropriation doctrines, by claiming a right to consumptive use based on location. Historically, this took its most notorious form in the Harmon Doctrine, named after an 1895 opinion given by Attorney General Harmon of the USA on the Rio Grande River dispute between the USA and Mexico. In this opinion, the United States denied that it had any obligation to guarantee stream flow to downstream Mexico, even from return discharges. H. A. Smith, an expert on this subject, had observed that 'the doctrine of absolute supremacy of the territorial sovereign is essentially anarchic...permitting every state to inflict irreparable injury upon its neighbors without being amenable to any control save the threat of war'. In practice, the Harmon Doctrine is less a doctrine than a hegemonic declaration, and has little legitimacy in international law or even subsequent actual practice. In 1907, the Supreme Court denied the state of Colorado's assertion of the Harmon Doctrine in its appropriation of the Arkansas River, shared with downstream Kansas (Sherow, 1990).
2. The second doctrine called the 'territorial integrity theory' or 'the natural water flow theory' entitles every lower riparian to the natural flow of the river without any interference from the upper riparian. Such interference is considered a violation of the territorial integrity of the lower riparian of which the river is a constituent. This theory is the antithesis of the first theory, and was advanced by Egypt in regard to the dispute with Sudan on the Nile water sharing conflict. According to Ferber (Guhan, 1993), 'The Harmon doctrine and Natural Flow

theory are both grounded in an individualistic and anarchical conception of international law in which personal and egoistic principles are raised to the level of guiding principles and no solutions are offered for the conflicting interests of upper and lower riparian’.

3. The third doctrine is that of historical use, which basically means “first in time, first in right”. This accords the first user of water a priority right whether or not his land is contiguous to the stream, or downstream from other users. Between nations or provinces, this corresponds to prior appropriation rights. Where, as in the case of Egypt, the downstream riparian is also the earliest user, historical use doctrine coincides with the natural flow theory.
4. Finally, there is the principle of 'equitable distribution' or 'equitable utilization', which regards a river or groundwater basin as an indivisible unit to be developed for the benefit of the maximum number of people regardless of territorial boundaries. The criterion formulated considers legal, factual, socio-economic, development, etc, for a settlement by mutual agreement among the concerned parties. The 37 Articles of the 'Helsinki Rules' 1996 (GOI, NCIWRDP 1999), have evolved around this theory. Apart from the Article on 'Equitable Utilization of the Waters of the International Drainage Basin' the dispute settlement mechanism recommends voluntary processes before resorting to judicial settlement. A milder version of this principle is recognition by each user not to harm the uses of others.

The Helsinki Rules have incorporated the notion of “prior appropriation”. Taking it in an absolute sense, the application of this notion would mean the predominance of the obligation not to cause injury to other riparian by interfering with existing uses. However, the Helsinki Rules treat prior appropriation as one element in determining equitable utilization, and not as a freestanding obligation protecting the *status quo*, which may not necessarily be reflective of equitable utilization (Salman and Uprety, 2002).

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The Helsinki Rules do not have the status of International Law. The United Nations has discussed and approved draft regulations pertaining to the 'Non Navigational uses of International Watercourses'. The Framework Convention adopted by the UN General Assembly in May 1997 (UN, 1997), is awaiting ratification by member states.

The UN Convention on the Law of the Non-Navigational Uses of International Watercourses is a framework convention that aims at ensuring the utilization, development, conservation, management and protection of international watercourses. It promotes their optimal and sustainable utilization for present and future generations. The Convention defines the term “watercourse” to include both surface water and groundwater that is connected to the surface water. It lays down certain factors and circumstances that should be taken into account for determining equitable and reasonable utilization. The Convention also deals with the obligation not to cause significant harm, and requires the watercourse states to take all appropriate measures to prevent the causing of significant harm to other watercourse states. A close reading of the Articles 5, 6 and 7 of the Convention lead Salman and Uprety (2002) to conclude that the obligation not to cause harm has indeed been subordinated to the principle of equitable and reasonable utilization.

Bangladesh and Nepal have voted for the Convention. India and Pakistan have abstained for different reasons. Pakistan indicated it had reservations with regard to the inclusion of groundwater, the obligation not to cause significant harm, and protection and preservation of the marine environment. India had reservations with regard to watercourse agreements, equitable and reasonable utilization and participation, non-discrimination and settlement of disputes.

One significant difference between the factors to be taken into account for equitable and reasonable utilization of an international watercourse under the UN Convention 1997 and the Helsinki Rules 1966 from which the former are largely derived is the deletion of compensation as a means of adjusting conflict among users. This is perhaps due to the fact that international trade in water is still anathema for most developing countries.

Another emerging feature in the codification of international water law is the increasing importance being given to the environment. A noteworthy resolution of the Institute of International Law is on the pollution of rivers and lakes (Athens, 1979). The resolution subjects the states’ right to exploit their own resources to the duty to ensure that their activities cause no pollution in the waters of international rivers and lakes beyond their boundaries. In 1997 at Salzburg, the Institute of International Law adopted three resolutions that deal with the environment. The term “environment” is defined to include “abiotic and biotic natural resources, in particular, air, water, soil, fauna and flora, as well as the interaction between these factors”. This wide definition subjects all uses of international watercourses to environmental law rules under international law.

Articles 6 and 9 of the first resolution emphasize the need that actions of the states “entail no harmful consequences” and that the state whose activity might be linked with damage to the environment should ensure that “such damage does not arise”. However, it should be added that such prohibition is not absolute, as it applies only to serious damage, or damage that affects the possibility of utilization by other riparians. The International Law Association, which developed the Helsinki Rules 1996, is also cognizant of environmental concerns. The rules devote a separate chapter to pollution.

International law has also re-discovered traditional water rights. In a landmark 1997 ruling, the International Court of Justice highlighted some fundamental legal issues. The existing law was to be made “more international” and more ecological, for example, by introducing the concept of “custodianship” or the “right of future generations” to natural resources. Both concepts exist in traditional laws on water practiced by indigenous peoples.

An important institutional difference between these doctrines is that the riparian and appropriationist ones imply decentralized decision making and private ownership or use rights to water, while equitable distribution within countries often is more likely to be associated with state ownership of waters. The countries in South Asia with a British

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colonial legacy (Bangladesh, India, Pakistan) continue to operate under the principles laid out in the 1873 Canal and Drainage Act (Nasir, 1993). Under this Act, the state has proprietary rights to water, while the provinces have use rights over surface flows for purposes of irrigation, navigation and drainage. Perhaps reflecting British riparian doctrine, it also prohibits the sale or subletting of water, leaving a legacy of rigid top-down allocation, especially in arid parts of South Asia.

In inter-provincial (inter-state) allocations, it is common to establish quotas or water sharing formulas, either by treaty (Colorado River, USA) or under centralized government administration (Yellow River, China; Indus Basin, Pakistan). To be effective, however, this “non-doctrine,” like the doctrines listed above, requires a governance structure for monitoring and distribution that is trusted by the parties concerned. If there is no trust, even scientifically rational allocations, faithfully executed, will not diminish water conflicts.

2.3. Models of Integrated River Basin Management

What is integrated river basin management (RBM)? What is new in RBM? The answers to these two questions can help in providing a perspective to the evolving world context.

Integrated river basin management systems bring fragmented water uses and users together. They create a framework that deals with an entire basin or sub-basin, not just a single water use or administrative jurisdiction. A river basin is defined by a system of waters, both ground and surface, flowing to a common terminus. RBM integrates this system of waters with its social, economic and political context (Svendsen, 2001). Basin units cut across administrative divisions. This is their strength and their challenge.

There are two archetypal organizational models for implementing RBM. The first is the authority model, in which a single unified organization is empowered to make decisions. The second is the coordinative model, in which existing administrative units work together to cover the entire river basin or sub-basin. While new institutional structures may be created, the bulk of the routine work is done by existing organizations. A

particular variant of the coordinative model is the bargaining arena, in which the controlling authority delegates planning and implementation to stakeholders within broad parameters, while retaining monitoring functions and binding authority of last resort.

The strength of the authority model is that its operational span of control coincides with the boundaries of the basin, internalizing upstream and downstream conflicts, and concentrating decision-making authority needed to resolve disagreements. The disadvantages are that the water authority is isolated from relevant policy sectors such as agriculture, the environment, and the economy. Authority is centralized, excluding broad-based stakeholder representation and accountability.

The coordinative model addresses some of the weaknesses. The linkages between water and other sectors provide a strong basis for transferring policies into action. It is also compatible with the decentralization of responsibilities. On the other hand, decision-making can be cumbersome, costs of coordination may be high, and political changes in participating jurisdictions can upset agreements.

These two models represent extreme situations, which specific examples often blend. Outside the WASSA region, there are a few examples of trans-boundary institutions based on river basins that may provide some indications of hopeful directions, as well as limitations of similar institutions within the South Asian countries. Nearly all of these are in economically developed countries, which may or may not limit their replicability in the region. These examples include the Rhine Commission (Bernauer 1997) and the International Joint Commission for the Great Lakes (Munton and Castle 1992), which have historically found some success with non-binding cooperative approaches among key insiders, notably governments, but have faced pressures to open up their decision-making to important stakeholders within civil society as the problems they confront have become more complex (Nickum 1999).

A rapidly evolving effort in a water scarce region is that of the Murray-Darling Ministerial Council, a cooperative Ministerial Council comprising representatives of the

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four involved states and the federal government that sets policy, while an authority-like Murray-Darling Commission supports and executes the council's decisions. Its effectiveness depends on cooperation and support among the governments of the participating administrations, each of which has different water policies, allocation procedures, and level of maturity of its water economy. Key components of the Murray-Darling approach are the 1993 Murray-Darling Basin Agreement that established new organizations at political, bureaucratic, and community levels to enable "the river and its tributaries [to] be looked on as one." and a Natural Resources Management Strategy.

Community participation and effective monitoring are critical elements of the Murray-Darling experience, but they are not in themselves adequate to overcome "irreconcilable claims," especially between upstream and downstream, and between established and new users (Pigram, 2000). Markets in water rights are well established within river valleys within individual states. Efforts are underway to allow water trading between states (Murray-Darling Basin Commission 2002). One major hurdle confronting the establishment of an inter-state water market is the need to obtain consensus among council members when different political parties are in power, especially when they differ between the federal and state levels (Chatterton and Chatterton 2001).

Can these examples from high-income countries be applied to South Asia? The TVA model may be successful in developing water resources in developing countries, but has a chequered record in management. For example, Sri Lanka is struggling to transform the Mahaweli Authority into a basin management agency after initial success in water resources development. Current attempts to use the Murray-Darling model in Vietnam and China are encountering fundamental problems.

RBM in developing countries has to take into account the following realities:

- Dense populations live in upper catchments and require access to water along with downstream urban populations;
- Water use is widely dispersed rather than concentrated and easily controlled;

- Administrative capacity to monitor and enforce regulations and standards is limited;
- Governance mechanisms to assign rights and regulate and enforce agreements and contracts are weak;
- Technical capacity to measure and monitor basin hydrology is limited;
- Civil society groups are not structured into associations needed to represent stakeholder interests in water;
- Pressures for transparency in public decision-making and regulation, including independent, investigative media, are not strong.

These factors preclude the wholesale importation of developed country models. However, adaptive RBM strategies can be potentially rewarding in terms of more productive use of water, mitigation of past environmental damage, and re-direction of water to uses the society values most highly.

2.4. Water Laws and Administration in South Asia

Water Laws and Administration in Pakistan

Pakistan is a largely semi-arid country that relies on irrigation agriculture for more than 90 percent of its food and fiber. The overlay in **Figure 1** of the Indus Basin irrigation system on the map of population densities across the districts of the country makes clear the degree of dependence on irrigation.

Pakistan has a federal system of government. In its Constitution, a Council of Common Interests is prescribed to formulate and regulate policies for matters in Part II of the Federal Legislative List, such as railways, mineral oil, natural gas, and the water & power development authority. The Federal Ministry of Water and Power is responsible for water sector policy formulation. The Water and Power Development Authority (WAPDA), an autonomous agency of the Federal Ministry, has been responsible for the development of water resources, including main dams, barrages, link canals, public tubewells and drainage projects, across the country. The barrages, link canals, tubewells and drainage schemes are handed over to provincial irrigation departments for operation and

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maintenance. However, WAPDA retains the management of the multipurpose reservoirs on the Indus and its tributaries, and operates them in consultation with the Indus River System Authority (IRSA) and provincial irrigation departments (PIDs) according to the water rights and seasonal allocations of the provinces.

The Indus River System Authority (IRSA) was established under the orders of the President of Pakistan on December 10, 1992 with headquarters at Lahore. It was intended to act as a forum of the provinces for the implementation of the 1991 Indus water accord. To a certain extent, it has not realized its original purpose as a mechanism for decentralized inter-provincial bargaining and coordination. In 1994, the Ministry of Water and Power and WAPDA reverted to allocations on the basis of historical use, rather than the accord. IRSA was dissolved in 1998, after the then Prime Minister announced controversial plans to build the Kalabagh Dam on the Indus River over the objections of NWFP and Sindh. The IRSA was revived in 1999, but as an agency attached to the Federal Ministry of Water and Power, with headquarters in Islamabad. In effect, it has been reduced from an autonomous inter-provincial bargaining arena to an executive agency for short-term operational decision-making.

The three on-line reservoirs at Tarbela, Mangla and Chashma and inter-river link canals are the key structural facilities for Indus Basin water management. Dams in Pakistan are used to store peak (*Kharif*) flow for use in the dry (*Rabi*) season; they do not provide storage from one year to the next. 84% of annual flows occur during the *Kharif*, but only 64% of canal withdrawals take place during that period. During the *Rabi*, there are only 16% of annual flows, but 36% of canal withdrawals – the three reservoirs serve to supply the 20% differential to all provinces of Pakistan.

The allocation of reservoir water shared by provinces is centralized, using ‘suggested criteria’ established on a 10-day basis. Before start of a season-*Rabi* (low flow October 1 to March 31; Reservoir draw down) or *Kharif* (High flow April 1 to September 30; Reservoir draw down April-June; Filling July-August; draw down in September), IRSA prepares and circulates to all concerned “Suggested Operation Criteria” for the three online reservoirs. The seasonal operating criteria provide an envelope of maximum and

minimum Rule Curves, which provide guidelines for operation. The Suggested Criteria are evolved on a 10-day basis, using the following considerations (Ahmad and Chaudhry, 1988):

- Anticipated seasonal inflow for the coming season is forecast on the basis of inflows of the existing season by statistical study of the historical data;
- Reservoir elevation on the last day of the outgoing season;
- Present day maximum canal uses during the season, if possible to be met out of anticipated availability, else reduced uses are provided;
- Flood routing during July and early August to the extent possible;
- To reserve reasonable storage (1.0 to 1.5 MAF) in the Tarbela reservoir towards the end of *Rabi* season for utilization in early *Kharif* (April-June sowing period);
- In the criteria for the *Kharif* season to ensure filling of the three on-line reservoirs by the end of August. In September, some stored water is generally utilized in maturing *Kharif* crops; and
- To take care of the specific O&M requirements of Tarbela, Mangla and Chashma or any occasional requirements.

The anticipated seasonal system operation for the Tarbela and Mangla reservoirs, and seasonal water availability, are reflected in a forecast bulletin attached with the criteria. Based on their anticipated shares, the provinces plan their canal use on a 10-day basis subject to variations in the forecast. The Chashma Barrage is the regulation point for the Tarbela Command Canals, except the Thal canal and other canals that take off above rim-stations, like the Swat and Warsak canals.

During the droughts of 2001 and 2002, IRSA failed to generate consensus over water allocation. Demonstrations in Sindh induced the President/Chief Executive (CE) to override its decisions. Technically, the resolution of such conflicts is a matter for the Council of Common Interests (CCI), but since it was inactive, the CE dealt with the problem at the apex. Subsequently, provinces have directly approached the Secretariat of the Chief Executive, much to the apprehension of IRSA. Further demonstrating a declining trust in IRSA’s ability to ensure that its decisions are implemented, the

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government of Sindh decided to send inspectors to upcountry reservoirs to check storage and diversions in person. Increasingly during 2002, critical decisions were taken in the CE secretariat in consultation with provincial governors. In 2003, the situation has changed again with the transfer of executive responsibilities by the President to elected governments at the Federal and provincial levels. However, it is not yet clear how water sector decision-making will take place in this set up.

One structural feature of decision-making may persist. Pakistan relies on irrigation for 90% of its food and fiber production, and irrigation is the predominant user of water. However, a broad division of responsibilities between irrigation and agriculture starts at the federal apex, with two separate ministries for water and for agriculture, and runs through the sector down to the farm. The provincial irrigation departments are responsible for the upkeep of barrages, main canals, drainage and flood works, assessment of water charges and resolution of conflicts among users. Provincial agriculture departments are responsible for agriculture research and extension, while their On-Farm Water Management (OFWM) directorates carry out watercourse lining and land leveling for enhanced water delivery and application efficiencies.

With strong coercive power under Sections 33 and 68 of the Canal and Drainage Acts (1873 - 79), the Canal Officers of the Irrigation Department can fine and jail individual irrigators and even entire irrigation communities for '*Warashikni*' (breaking the water turn) and related offenses. However, the system has come under a great deal of stress. On September 8, 2001 the government announced a major re-examination of the existing provincial irrigation departments. With *abiana* (water rent) collections in NWFP recovering 38% and in Punjab only 32% of just the current O&M costs, some things have to change.

A new option has become feasible with the introduction of district governments in Pakistan. Already, OFWM officials are looking to district *Nazims* (elected representatives) to support proposals for the leveling of rough land, and for watercourse lining. It may be possible to access the poverty alleviation funds through the district governments. However, the district government system is new and will need to establish

a demonstrated capacity for conflict resolution and for establishing a support system for the operation and maintenance of irrigation.

A legal basis exists since 1997 in the form of provincial Irrigation and Drainage Acts (e.g. Government of Balochistan, 1997) for participatory farmer management of minor canals and distributaries. However, after five years of social mobilization under projects funded by the World Bank and other donors, Farmers Organizations have been established only in some pilot areas.

Parallel to the official discourse, a stream of literature is emerging in political geography on water laws, social power and geographically differentiated impact. For example, through critical legal analysis of the Canal and Drainage Act (1873), Mustafa (2001) reveals that the balance of legal rights enshrined in the Act is heavily in favor of the state as opposed to water users. Indeed, it lends itself to differential enforcement because of its insensitivity to issues of social power.

Mustafa then goes on to demonstrate the significant difference in practice between the registration of *tawan* (collective fine on water users along a watercourse for *moga* tampering) cases in different areas of Sidhnai and Shorkot sub-divisions of the Haveli Canal Circle, Punjab, Pakistan. Tracts dominated by large landlords have few cases of collective fine registered against them, “simply because the local irrigation staff would not dare report *moga* tampering by a powerful person”. It is not the case that there is less water theft in these tracts. Section 68 cases (involving water thefts by individuals), show no such variance between large landlord dominated and small farmer tracts. In fact, large landlords may have them registered against recalcitrant neighbors, or farmers may genuinely have complaints against each other (Mustafa, 2001).

However, in this era of global information, water users and vulnerable populations now are much more likely to suggest social explanations than naturalistic or fatalistic explanations for their differential access to irrigation water and vulnerability to flood

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hazards (Mustafa, 2002). Illiterate small farmers in four villages of Punjab are acutely aware of the political manipulation behind levee breaches.

Water Laws and Administration in India

The river basins of central and southern India shown in **Figure 2** illustrate the inter-state nature of its rivers. It is not surprising that the framers of the Indian constitution drew up very specific laws and provisions governing the development and management of the country's water resources. During the last five decades, the changes in these laws and provisions, under the quasi-federal system of governance (Union of States) have been complex. Some details are provided in Part II of this Study. Basically, 'water ' is a State subject, with the Union's role limited to the Inter-state Rivers. However, the process of planning permissions allows the Union Government to have an effective veto in large State water projects.

A National Water Policy (NWP) for India was defined only in the year 1987 (GOI, 1987b), forty years after India attained independence, and many of the policies contained therein still need to be implemented. The need for a NWP was stated as “Water is a scarce and precious national resource to be planned, developed and conserved as such, and on an integrated and environmentally sound basis, keeping in view the needs of the States concerned”. This policy was approved by the ‘National Water Resources Council’ (NWRC) in the meeting held in 1987 under the chairmanship of the Prime Minister of India with participation by the Chief Ministers of the States and Administrators of Union Territories as members (GOI, NICWRDP, 1999). The NWRC is an apex body with the mandate to evolve NWP for the development and use of water resources in conformity with national interests.

The policy document (GOI, 1987b) deals with a wide range of water issues in its 21 sections. Section 7 highlights the ‘Groundwater Development’ issues of over-exploitation, conjunctive use of surface and groundwater, and the need for regulations that are relevant to Ground Water Resources; Section 8 recommends ‘priorities in Water allocation’ as under:

- Drinking water;
- Irrigation;
- Hydropower;
- Navigation;
- Industrial use.

The policy suggests that the "Drinking water needs of human beings and animals should be the first charge on any available water". It further says, "Irrigation and multi-purpose projects should invariably include a drinking water component wherever there is no alternative source of drinking water". With regard to irrigation, the policy document states, "There should be a close integration of water-use and land-use policies. Water allocation in an irrigation system should be done with due regard to equity and social justice".

Since the adoption of the National Water Policy 1987, many developments in the water sector at the national level have necessitated its revision. A revised National Water Policy 2002 was approved by the National Water Resources Council on April 1, 2002. The following are some of the highlights of this policy:

Water allocation priorities:

- Drinking water
- Irrigation
- Hydropower
- Ecology
- Agro-industries and non-agricultural uses
- Navigation and other uses

However, priorities can be modified or added to, if warranted by considerations that are specific to an area or region.

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Institutional Mechanisms

Appropriate river basin organizations should be established for the planned development and management of a river basin as a whole, or of sub-basins, where necessary. Special multi-disciplinary units should be set up to prepare comprehensive plans, taking into account not only the needs of irrigation, but also harmonizing various other water uses. This will ensure that the available water resources are determined and put to optimum use, having regard to existing agreements or awards of Tribunals under the relevant laws. The scope and powers of the river basin organizations shall be decided by the basin states themselves.

No details of sharing of waters between states are discussed in the policy. However, an official level Working Group has been set up under the chairmanship of the Chairman of the Central Water Commission, with representatives of eight states to work out the draft Guidelines. It is expected that these policy Guidelines, when finalized, would expedite resolution of inter-state water disputes. The broad objective of the guidelines governing the allocation of water is defined as "Developing the waters of Inter-State River for the betterment of the population of the co-basin States/Union Territories to the extent such developments are not detrimental to the interests of other co-basin states."

Water Laws and Administration in Nepal

Nepal is a water-rich country with more than 9,000 m³ fresh water resources per capita. **Figure 3** shows the six major river basins of Nepal that drain down from the Himalayas.

Although Nepal does not have the historical legacy of the 1873 Canal and Drainage Act to struggle against, its rights system is quite similar, as provided for in very recent legislation. The Water Resources Act, 2049, provides that all water resources in Nepal, whether surface, underground or atmospheric, belong to the state. Anyone who uses water should have a license, except in certain cases such as for personal domestic use, irrigation by informal groups, cottage industries, or water mills. Priority of water use goes to drinking and household uses while irrigation and other agricultural uses rank

second, and hydropower third. Except for hydropower, water use licenses are to be obtained from the District Water Resources Committee, chaired by the Chief District Officer.

Because there is a proliferation of sector-based committees overseeing water use, it is easily foreseeable that there will be a need for an inter-sectoral conflict resolution mechanism to allow for effective planning.

Supplementing this act, the Local Self-Governance Act, 2055 (1998) empowers local authorities with certain ownership rights over natural resources within their territory. Public water bodies in their domain such as ponds and wells that do not belong to the government in Kathmandu, and which are not owned by the District Development Committee, are the property of one of the 3913 village development committees (VDC). Similar provisions apply to the 58 municipalities in Nepal. The VDC has the right to tax the use of natural resources within its domain. While there appears to be no explicit provision for individual or transferable rights, recognition is given to the need to involve and empower beneficiary farmers in an irrigation system.

Water Laws and Administration in Bangladesh

Bangladesh is another water-rich country with more than 9,500 m³ freshwater resources per capita. The river basins of Bangladesh are shown in **Figure 4**.

The National Water Policy (NWPo), formulated in January 1999 (GOB, 1999) makes a firm commitment to a more equitable allocation of water rights and sharing among the different water using sectors. In recognition of the water requirements for open water fish and fishing community, specific clauses (given below) have been included in the NWPo:

- *Natural water bodies such as beels, haors and baors will be preserved for maintaining the aquatic environment and facilitating drainage.*
- *Water bodies like baors, haors, beels, roadside borrow pits etc. will, as far as possible, be reserved for fish production and development. Perennial links of these water bodies with the rivers will also be properly maintained.*

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- *Water development plans will not interrupt fish movement and will make adequate provisions in control structures for allowing fish migration and breeding.*

The National Water Management Plan (NWMP), nearing completion, stipulates that ‘water structures should be so designed and operated that there are no major obstacles or danger points on fish migration routes’ (WRPO, 2002). The NWMP also recommends that fish passes or gates be included in all regulators, and be kept open as far as possible, but especially in the key migration months. Strategies for fish and fisheries management are to be agreed to at local levels, so that potential land or water use conflicts (especially with the farmers) are avoided, or at least minimized. The basic premise is that there has to be a symbiotic balance between the two interest groups: the fishers and the farmers – who need water at different times and in different quantities.

3. CONFLICTS AT THE STATE AND PROVINCIAL LEVELS

In this chapter, we review the existing conflicts between the provinces and States of Pakistan and India. They mostly occur where river basins cut across provincial or state boundaries, though there are also cases involving inter-basin transfers and non-riparian beneficiaries. The key elements of these inter-state conflicts are extracted from the Case Studies in Part II of this Volume. They are listed in Table 1 below.

Table 1: Key Water Sharing Conflicts between States or Provinces

Basin or Dam	Parties to the Conflict	Nature of Conflict	Current Status/ Mediators
1. Indus – Pakistan	Punjab, Sindh	Water sharing	Continuing. IRSA and CE secretariat
Indus (Eastern Rivers) – India: Ravi-Beas	Haryana, Punjab, Rajasthan, Delhi	Water sharing	Ravi-Beas Tribunal Continues.
Ganga Sub -Basins:			
3.1 Yamuna	Delhi, Haryana, Himachal, Rajasthan, Uttaranchal	Water sharing	Agreement reached in May 1994, Upper Yamuna Board monitors.
3.2 Sone	Bihar, Madhya Pradesh, Uttar Pradesh	Assessment of basin yields	Conflict continues.
3.3 Damodar	Jharkhand, West Bengal, Union Government	Submergence of uplands and coal mining areas; flood control benefit not fully realized	Impasse in further development.
3.4 Upper Ganga including Ramaganga	Uttaranchal and Uttar Pradesh	Potential conflict on storage dam projects owing to the submergence and irrigated tracts in now different States	Ganga Management Organization to be set up.
4. Barak	Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura	No progress on multipurpose project, owing to divergence in submergence costs, and benefits	-
5. Narmada	Gujarat, Maharashtra, Madhya Pradesh, Rajasthan	Conflict between affected people and States	In public interest litigation filed by NGO, Supreme Court (Oct. 2000) has allowed construction of dam, subject to provisos.

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6. Godavari	Andhra Pradesh, Karnataka, Orissa, Madhya Pradesh, Maharashtra	Conflict resolved in 1980 after twenty plus years.	Mutual negotiations, bilateral and trilateral agreements among the five parties, ratified by Tribunal.
7. Krishna	Andhra, Karnataka, Maharashtra	Alamatti dam, Telugu Ganga Project and other water sharing issues	Tribunal award due for review in 2000. Review tribunal being set up.
8. Cauvery	Karnataka, Kerala, Pondicherry, Tamil Nadu	Water sharing	Cauvery Authority has been set up and is functioning. The final award of the Tribunal is awaited.
9. Pennar	Andhra Pradesh, Karnataka	1892 Agreement reopened on grounds of improvement to tanks, unauthorized diversions	Legal recourse initiated by a State.
10. Brahmani-Baitarani	Jharkhand, Orissa, Madhya Pradesh	No conflicts owing surplus water flows	-
11. Subernarekha	Bihar, Jharkand, Orissa, West Bengal	Inter State water agreements negotiated since 1964.	-
12. Mahi	Gujarat, Madhya Pradesh, Rajasthan	-	Project specific agreements have worked well.
13. Tapi	Gujarat, Maharashtra, Madhya Pradesh	-	Project agreements and Interstate Control Board has worked to common benefit.
14. Mulla Periyar Dam	Kerala, Tamil Nadu	Dam safety, submergence of reserve forest land and wildlife sanctuary	Supreme Court has directed establishment of Experts Committee.

A brief description of these conflicts is provided below, while narratives on the history of the disputes may be found in Part II, the Case Studies:

1. The Water Accord 1991, a non-doctrinal water sharing formula, provides the basis for water allocation in the Indus Basin of Pakistan. However, the debate continues regarding the sharing of shortages in drought years, mainly between Punjab and Sindh provinces. The arguments made by the two sides may be read as varying interpretations of the principles of rational and equitable utilization, prior appropriation and the need to reserve water for nature and essential ecosystem functions.
2. In the Ravi, Beas and Sutlej rivers of the Indus system in India, the assessment of excess flows (over and above the already allocated flows to the states under past agreements) and its sharing among the states remains a bone of contention. The Ravi-Beas Tribunal has not been able to resolve the issue so far. Even court orders are not honored. There is an impasse.
3. The current situation in the Ganga Sub-basins is as follows:
 - a. In spite of a negotiated settlement on sharing of the flows in the Yamuna, the irrigation needs of the states have conflicted with the water supply needs of Delhi City resulting in frequent interventions by the courts. The Upper Yamuna Board set up to monitor the implementation of the agreement has made efforts to resolve the issues;
 - b. The Chambal Control Board resolves inter-state issues informally since the tacit informal understanding with one of the party states (the lower riparian) has not been formalized;
 - c. The assessment of 75% water availability in the Sone river basin has not been settled since one of the states is procrastinating in accepting the assessments made by the Sone River Commission;
 - d. The planned Damodar Valley projects could only be partially implemented due to submergence problems. The priority given to irrigation or power creates frequent conflicts (in the years of short storage in the reservoirs) among the party states resulting in less than optimal benefits. Uncompleted projects have further reduced the benefits; and
 - e. The Upper Ganga now falls under the control of the newly formed state of Uttaranchal. Disputes about sharing the benefits and costs of existing projects and in the implementation of new projects have surfaced.
4. In the Brahmaputra basin, which is the most water-rich basin in India, even though there is no water sharing conflict between states, mega projects planned in the upper reaches of the river have either been scaled down or re-designed as

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- smaller cascade development schemes due to submergence problems and disputes in sharing of benefits.
5. In the Barak river, the Tipaimukh high dam project which is envisaged to provide hydropower, flood control and irrigation benefits has not made much progress due to lack of agreement amongst the riparian states on the issues of reservoir submergence areas and the sharing of benefits.
 6. The Narmada river dispute is the most visible in India, as well as internationally. A tribunal award resolved the initial issue of water sharing. However, the height of dam, benefit sharing and the mode of settlement of project-affected people caused serious difficulties in implementation, particularly of the Sardar Sarovar dam (the terminal dam on the river). Project-affected people agitated under the banner of the dedicated NGO - The Narmada Bachao Andolan (NBA). The NBA followed up by Public Interest Litigation (PIL) in the Supreme Court. The NBA questioned the benefits claimed from the major projects, challenged the resettlement and rehabilitation packages for project affected people of the reservoir submergence and canal affected zones and its implementation. It also rejected the environmental impact assessments made and the remedial actions taken by the project authorities. This challenge created worldwide attention to the major development activity planned in the valley. The Supreme Court also deliberated on this issue for several years but finally upheld the Tribunal Award and allowed the construction to proceed, subject to conditions. The Court introduced a mechanism to monitor the progress of resettlement pari-passu with the raising of the height of the dam through a Grievance Redress Cell in each of the party states.
 7. The Krishna Water Disputes Tribunal Award was to come up for review in May 2000. However, a few years before the review of the Tribunal Award became due, efforts made by the upper riparian state Karnataka to reallocate its share of water in the river and raise the height of the Alamatti dam by increasing the FRL through modification of gate height was raised in the Supreme court. A Five Member constitutional bench heard the original suits of both the States and delivered its judgement on 24th April 2000, restricting the height of the Alamatti dam, subject to certain provisos. Karnataka has sought court's intervention to stop all new projects on the river by the lower riparian Andhra Pradesh, till the water sharing issue is resolved again. The Government of India has approved the process to establish a Review Tribunal.
 8. The Cauvery river water dispute is about inadequate flows in the river to meet the demands of all the party states. Though technical solutions are put forth to share the distress, political expediency is creating hurdles.

9. In the Pennar basin, improvement/ rehabilitation of tanks on the basis of old agreements proposed by one state without approval between the states are questioned legally in the courts.
10. In the Brahmani- Baitarani basin, there are no disputes since the basin has surplus flows.
11. In the Subernarekha basin projects are undertaken by mutual agreements since the benefits and costs to be shared have been well defined.
12. In the Mahi basin, several negotiated project-specific agreements have worked smoothly due to clear understanding on the sharing of water, sharing of costs of land acquisition, resettlement and rehabilitation, and the sharing of benefits.
13. An Inter-State Control Board for the Tapi basin implements joint projects efficiently and speedily, as several project specific agreements on sharing of waters, costs and benefits have been put in place.
14. The Mulla Periyar Dam is a part of an old (1885-1897) water transfer scheme on the west flowing Periyar river. The submergence of reserve forest and Elephant Wild Life sanctuary are the grounds for objecting to rehabilitation of the dam and raising its conservation storage level. Legal recourse has not yielded the desired results so far.

Even from this summary, it is apparent that “water sharing conflicts” encompass a range of issues in addition to the allocation of water. These include:

- Conflicts over data --- for example, the Government of Sindh has recently decided to send its inspectors to Chashma reservoir to validate the discharge data provided by WAPDA (a federal agency);
- Conflicts over interest --- for example, between timing of releases from the Rihand Dam for hydropower needs in UP and for irrigation in Bihar;
- Conflicts over values --- for example, over reserve forest lands and wildlife sanctuaries in Kerala that could be submerged with the full operation of a dam; and
- Conflicts over relationships --- for example, over costs of submergence in Uttaranchal, and benefits from irrigation in UP, now that the two are separate States.

Another feature is the variety of instruments used for conflict resolution, ranging across judicial, semi-judicial, administrative, semi-autonomous and political branches

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of government, and comprising regular courts, special tribunals, control boards, river basin authorities, development corporations, ministerial and expert committees and sub-committees, and meetings of apex political leadership.

A common factor in these conflicts is their long duration.

4. LOCAL AND SUB-REGIONAL CONFLICTS

Water security can be as crucial an issue at the local and sub-regional level as at the inter-state or inter-provincial and international scales, even though narratives of water conflicts between countries and provinces tend to get more publicity. First, there are the multiple impacts of large development projects. Inter-basin transfers of water, for example, affect household security, village security and valley security. Second, the interplay between ‘street-level’ bureaucrats, markets, and social solidarity may bear fruit in a constructive engagement or lead to incoherent violence.

In India, a social mobilization program for participatory irrigation management has made significant progress after initial teething troubles. The legal bottlenecks in promoting the involvement of farmers have been removed and certain basic policy measures introduced. As a result, about 23,626 water users associations (PC, 2001) are functioning successfully in 14 States (2002). The pace of establishing these WUAs will be further accelerated during the 10th Plan (2002-07) to cover an additional 10 million hectares. However, the scaling up of such activities will eventually lead to a situation where conflicts and incompatibilities along an upstream-downstream dimension will emerge. The practical experiences in handling such challenges are limited.

A rare attempt to establish “river parliaments” in parts of India represents one interesting example (Agarwal and Narain, 1999). As a result of the combined efforts of villagers and an NGO in a part of dry Rajasthan from the mid 1980s onwards, a dry and seasonal river was brought back to life through the building of almost 2500 rainwater harvesting structures. With water gradually coming back in the river from 1990 onwards, the interest of the government was revived. Since rivers are legally the property of government, it appeared as if government would take over control of the fruits of the efforts of the communities along the river. Only vigilant mobilization made it possible to form a “river parliament” in 1999 as an association of all the villages along the river course. The parliament has set rules and regulations for river management, which include restrictions on the type of crops that can be grown in the basin.

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These successes are matched by portrayals of pervasive local and sub-regional conflicts across India. Box 1 lists the section and sub-section heads of two published papers by researchers from the Madras Institute of Development Studies at Chennai:

Box 1: Local and Sub-regional Water Conflicts in Tamil Nadu, India

Groundwater Conflicts

Conflicts in the use of groundwater in rural areas:

- Conflicts owing to fragmented ownership of a well
- Conflicts between well owners
- Conflicts between water sellers and purchasers
- Conflicts emerging in surface systems due to increased groundwater use

Conflicts arising out of industrial and urban water needs:

- Conflicts due to increasing urban water needs
- Conflicts due to environmental damage

Conflicts over Water Supply

Debates over Inter-basin Diversions

Conflicts between Municipalities and State Government:

- Conflicts regarding contributions to irrigation benefits
- Conflicts regarding water charges

Conflicts between Urban People and the Municipality regarding Water Tax

Water Conflicts between Farmers and State Government

Conflicts over Industrial Water Supply

An average watercourse in irrigated Pakistan has about 30 percent head-end farmers expropriating 70 percent of the water, and the conflict between them and tail-end farmers is pervasive across much of the irrigated Indus Basin. Warabundi (water turn) disputes may linger on for years between neighboring farmers. It is common for cases to be decided and for the decision to be reverted upon appeal at successive levels of bureaucracy in the irrigation department. Yet, it would be a mistake to assume that water sharing is the only or dominant cause of conflict in the irrigated Indus Basin. Damage to downstream ecosystems from discharge of saline effluents and the run-off of chemicals

used in high-input agriculture is emerging as a significant threat to livelihoods. The depletion of groundwater, especially outside the Indus Basin, is another source of local tensions that sharpen into conflict and violence at times and places.

Some cases of sub-regional and local conflicts in Pakistan, India, Bangladesh and Nepal are illustrated in Table 2.

Table 2. Examples of Local and Sub-regional Conflicts

Country, Area	Stakeholders	Nature of Conflict	Status
Pakistan, Irrigated Indus Basin	Head, middle and tail end farmers on <i>Sirkari</i> watercourses	Warabandi (water turn); Water theft (obstruction, breaches, pipes, <i>moga</i> tampering, and so on)	Pervasive.
Pakistan, Manchhar Lake	Fishers, upstream rice farmers, government	Saline effluent from outfall drain has damaged lake and fisheries	Project to extend outfall drain to the sea may mitigate the damage.
India: Alwar district, Rajasthan	Tarun Bharat Sangh, a NGO & 500 villages communities; Government	Rights over dried up river that was revived by community investment in 2500 rainwater harvesting structures	On-going: “River parliament” of riparians has established rules & regulations for river management.
Bangladesh: Sylhet haors, Kawadighi Haor	Farmers, irrigation and flood protection managers, fishermen	Reduction in fish habitats, populations, and diversity owing to conversion of wetlands to farmlands. Need for rapid drainage of water at start of winter rice cultivation	Constructive engagement. Experimental fish pass allows fish migration and breeding. Potential for scaling up under the National Water Management Plan.
Bangladesh: Coastal Cox’s Bazar	Shrimp industry, rice farmers	Land and water use conflicts as powerful shrimp industry inundates coastal ponds with saline water and aggravates soil salinity, delaying drainage and farmers’ access to rice seedling beds	Impasse; Unless industry shifts to fresh water prawns, which also have an export market and which can be farmed in rotation with winter rice, and land use zoning is enforced.
Nepal, Melamchi river basin and Kathmandu	Rural and Urban users, Municipalities, Development Bank	Project to augment city water supply by inter-basin transfer via 27 km long tunnel through mountains has	Melamchi project under progress with ADB assistance. No major project in hand to reduce leakages that equal 40%

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		environmental impacts	of city water supply.
Nepal: Chitwan valley, Khageri Irrigation Project and Baghmara Forest community on the edge of Chiltan National Park	Managers of community owned irrigation systems, Community forest groups as eco-tourism operators	Proposal for lift irrigation that would dry up the local stream used for lucrative canoe rides and deplete biodiversity	Constructive engagement with potential for conservation and development – slightly longer irrigation canal from main river that maintains flows in stream.

Local conflict is confined both within a hydrological and an administrative unit, while a sub-regional conflict extends across hydrological units, but not the relevant administrative unit. Purely local conflict is obviously more common, but which is more critical? We do not have an empirical answer, but a concept of conflict-intensity can be fleshed out for geographical scale, using for example, Maslow's famous theory of the hierarchy of human needs (Maslow, 1954). Broadly, the group of basic needs (for air, water, and food) has first priority till fulfilled. Security needs (for shelter, safety, health, etc.) have next priority. When these have been met, social or relationship needs predominate until they are satisfied. Finally, ego and self-actualization needs emerge and they have no limits. It is possible to map a hierarchy of security needs into this broader hierarchy of all needs.

In Table 3 below, we present examples of intentioned insecurities generated by water conflicts at sub-national scales. They are tabulated against the hierarchy of human needs for security.

Table 3. Sub-National Water Sharing Related Insecurities

Hierarchy of Needs (Security Needs)	Recent Examples of the Means of Insecurity
Basic Needs (Livelihoods)	Disruption of rice farmers livelihoods by salinization of coastal ghers at Cox’s Bazar by the shrimp industry (Bangladesh)
Security Needs (Physical Security)	Submergence of homes (shelter) in the head ponds of Tehri and Narmada dams, (India)
Social Needs (Network Security)	Severance of human settlements by irrigation infrastructure in the Chashma Right Bank Canal Command, Pakistan (2001)
Ego Needs (Identity Security)	Protests by politicians and farmers associations in Sindh against planned Thal Canal, Punjab, Pakistan (2002)

The suggestion here is that, while local disputes may be sharper, their underlying needs can also be met more readily. Stomachs can be filled, houses can be provided, and even bridges built to hamlets on the other side of the canal. On the other hand, the ego needs of some politicians appear to have no upper limit. We will revisit this finding in the recommendation to start small and to build upwards.

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5. ANALYSES AND LESSONS

What lessons can be learnt from the experiences of water conflicts within South Asian countries, in the human security perspective? One of South Asia’s most striking characteristics is its physical diversity, especially the variation in water availability. Many of the water problems faced by the neighboring countries are very different. For example, in Pakistan agriculture consumes 97% of the water, while in Nepal the urban demand of Kathmandu is a dominant issue in the intra-country context. In Bangladesh, the key conflicts appear between farmers, fishers and aquaculturists. In spite of this, the South Asian countries have many experiences in common, partly owing to overlapping civilizations and cultures, partly to shared low levels of economic and human development, and partly to a similar heritage of laws, especially the Canal and Drainage Acts. Even in these aspects, however, there are growing differences, especially as their patterns of governance have diverged. In this chapter, we analyze and draw lessons from these diverse and common experiences of provincial (state), sub-regional and local conflicts.

5.1. Varying Nature and Origin of Conflicts

In Chapter 3, four conceptual categories of conflicts were recognized - conflicts over data, over interests, over values and over relationships. Water-sharing conflicts within the countries of South Asia can indeed be classified in this manner, but most actual cases combine two or more dimensions. In the India Case Study presented in Part II of this Study, a set of proximate causes of conflicts (technical and non-technical), in river water sharing have been identified:

- Disagreement on water availability, especially during lean seasons;
- Disagreement on the basic hydrological data and the actual present utilization of water;
- Lack of openness and transparency in exchange of data/information;
- Disagreement on the present and future water requirements for various uses and the basis thereof;
- Differences in approach to planning, design, construction, and operation of joint projects on trans-boundary rivers;
- Different interpretation of operative clauses and sub-clauses in existing Agreements, Treaties, and tribunal awards;

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- Disagreement on riparian rights and basis thereof;
- Disagreement on the basis and modalities of water sharing;
- Lack of institutional arrangements for implementing the Agreements or tribunal awards;
- Violation of agreements by one party or the other; and
- Rigid political or administrative positions.

It has been noted that as the dispute progresses, the technical and non-technical categories get so intertwined that they cannot be separated and resolved on technical merit alone.

In the following sub-sections, we explore the origins and character of conflicts in a manner that could lead directly to possible solutions, if any. It entails identifying the primary determinants of conflicts that could be addressed at institutional, policy and program levels.

Scarcity

Is scarcity a primary determinant of conflict? There are strong indications that inter-state conflicts in India are more severe and complex when the available water is scarce. Such scarcity could exist in current per capita terms or as a function of the degree of closure of the basin (the percentage of surface water utilized). It could be perceived scarcity in relation to climatic and other risks, or in terms of the demand-supply gap generated by the envisaged development pathway. Indeed, conflicts are relatively more complex to resolve in the six river basins of India that are relatively water-poor, have higher degrees of closure, and are more vulnerable to climatic variability.

Pakistan has changed over the past 50 years from a relatively water-rich country to one with little new water to spare for a growing population. Pakistan stands nearly alone among the world's nations in having developed its water nearly entirely for agriculture, with only 3% for other uses. Per capita water availability is falling towards the 1000 m³ level that is the commonly accepted index for a water-stress condition. A three-year drought in 1999-2001 has severely tested the limits of current supply and delivery facilities, especially outside the Indus Basin. Under these circumstances, one might expect tensions to increase over water and food supply. Indeed, water scarcity was a high

profile national issue during the drought years, and a number of mega-water projects were launched to augment supplies.

On the other hand, we have documented a number of conflicts where scarcity is not the issue. For example, cases of submergence and re-settlement are related to an excess of water. In Bangladesh, scarcity is limited to the lean season flow months of March and April, but intense conflict occurs in November and December, when farmers need rapid drainage to plant rice and fishers need to protect their fish stocks. Environmental degradation, such as caused by the drainage of saline or chemical effluents into Manchhar Lake in Pakistan, may generate conflict even where water is abundant. Thus scarcity is not necessary for conflicts to occur.

We have also documented a case of extreme water scarcity leading to collaborative action for water harvesting across 500 villages. The drying up of a river is an extreme situation. Its resurrection by investment in rainwater harvesting structures and cropping pattern control is an equally strong demonstration that scarcity is not a sufficient condition for conflict to occur. Sometimes a severe challenge provokes a creative response, and sound leadership helps the stakeholders accomplish huge tasks through mutual cooperation.

Technical: characteristics of rivers and aquifers, specific kinds of human demands

Are there technical characteristics of river basins and aquifers that make conflicts more complex to resolve or alternatively allow resolution with gains for all stakeholders? Michel (1967) has documented a notable example at the international scale. The geomorphologic feature that made feasible inter-basin transfers from Western to Eastern Indus Rivers also made possible the partitioning of the Indus Rivers between Pakistan and India. Once the waters were divided, conflict was reduced between the two otherwise hostile neighbors.

On the other hand, development options can exacerbate conflict. Large dams are feasible in its upstream reaches of the Indus to further regulate its flow. This technical potential foreshadows the conflicts between the provinces of Pakistan, owing to perceived unequal

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incidence of potential benefits and costs. NWFP fears the submergence of cultivated and other lands, and the displacement of people. Sindh perceives that further reduction in freshwater flows to the coastal mangroves will accelerate the degradation of this ecosystem and extend seawater intrusion further inland. Punjab on the other hand, sees a need for expanding cultivation and more assured surface supplies to existing cultivated areas, to control the draw down of groundwater and the threat of saline water intrusion into fresh groundwater zones.

It is not possible to divide the waters of Ganga-Brahmaputra-Meghna (GBM) -GBM among the riparian countries of the region and within the provinces/states of each country. The GBM waters have not been allocated to each state/ province within each country, though the demand for such allocation exists in India. It seems that grandiose plans, for example, for inter-basin transfers through national water carriers, national water grids, garland canals and so on provide materials for debates and may distract attention from the real issues, but rarely cause conflict in the strict sense (Verghese, 1999).

Demand side characteristics have a similar potential for aggravating or mitigating conflict. For example, different kinds of industry and levels of internal recycling have varying demands for water and effects on national water quality, while growing megalopolises can render rivers unusable downstream by using them as drains for untreated sewage. Changes in consumption habits and broadening of markets, especially with globalization, can affect water use. Thus over-consumption by rich consumers in the world markets may contribute to environmental degradation and local conflict. We have documented such a case in the production of Tiger Shrimp that is grown under saline conditions in the coastal areas of Bangladesh. Almost all the production is exported to the European Union, Japan and the United States. With intensified commercial production by a minority of shrimp producers, the coastal polders have become increasingly saline and unfit for rice cultivation by the majority of small farmers. A shift in consumer preference in favor of Giant Prawn that is reared in freshwater could

mitigate the conflict. Consumer education could be the strategic response in a number of other water conflict situations also.

Political

It is a fairly common assumption that political positions harden and disputes become more complex, entangled and difficult to resolve the longer a conflict is allowed to fester. We cannot restate this with the force of an axiom. However, this Report does document the case of the Cauvery Water Dispute that has become highly litigious and hostile after a long period of negotiations.

Negotiations started in 1968 between Karnataka and Tamil Nadu with the Government of India acting as a mediator, well prior to the expiry of the 50 years period of validity of 1924 Cauvery water sharing agreement. However, the efforts did not result in a solution. The Cauvery Waters Dispute Tribunal was set up on the directions of the Supreme Court in 1990. The tribunal did emerge with an interim relief award in 1991, but Karnataka contested this. Thereafter, the constitutional authority (the tribunal), the apex judicial authority (the Supreme Court) and the highest executive authority in India (the Prime Minister) have been periodically engaged in dispute resolution. On the public side, a wide range of actors, including farmers and matinee idols of the film world in Tamil Nadu and Karnataka, have joined the chorus of protests. Political expediency in both States has become the driving force in perpetuating the dispute.

Institutional, legal, and informational inadequacies

Institutional, legal and informational deficiencies contribute to the aggravation of conflict to a degree. We have noted several examples of the undermining of bargaining arenas, such as tribunals and the IRSA. Groundwater is being over-drawn in several regions of South Asia, but effective legislation to control unsustainable use has not emerged. At the operational level, there remain deficiencies in monitoring and measuring flows in the main reservoirs in real-time and at any time at the community watercourse level. This inter-locking triad of institutional, legal and operational deficiencies does certainly make “objective” decision-making difficult.

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In India, for example, there is no policy on allocation of ground water resources in each basin to the basin states. Overexploitation in many basins has caused serious salinity and other related problems. A Ground Water Regulation Bill, based on a Model Bill circulated by the Central Government, is now being evolved by all states for enforcement. Tribunal awards and negotiated agreements on surface water sharing of rivers have not yet taken into account the ground water resources available in each basin for equitable distribution among riparian states.

Demand management is still not in force in most irrigation commands in South Asia though it is acknowledged as essential for water conservation and for ensuring equity in distribution of water among users, particularly in the canal commands. A demand management approach supported by appropriate tools could mitigate many local conflicts in the region.

5.2. The Political Structure

Among the four countries in our Study, two are water-rich (Bangladesh and Nepal) with more than 9,000 m³ of freshwater resources per capita. The other two (India and Pakistan) are water-short with less than 2000 m³ of freshwater per capita. It so happens that the water-rich countries of South Asia have unitary forms of government, while the water-short countries have Federal or quasi-Federal forms of government. There is no necessary correlation, as a slightly larger sample of countries demonstrates. Large countries, like the USA, may have water-rich and water-short regions. This is shown in Table 4.

Table 4. Freshwater Resources and Governance

	Unitary	Federal
Water rich	UK, France, Nepal, Bangladesh	Canada, Germany, USA(Eastern part)
Water short	South Korea	Australia, India, Pakistan, USA(Western part)

Does political structure make a difference? Does the Constitution of a country affect the nature of conflicts, the way they are addressed, and the range of possible solutions? In

particular, is conflict more likely to occur between sub-national units (states, provinces) in a federal system or a centralized system? Amongst the countries studied here, India is the most federal, Pakistan is federal in form but not always in practice, and Nepal and Bangladesh are central.

The experience elsewhere has been that centralized states such as France and the United Kingdom (excluding Scotland) have been able to develop privatized river basin authorities that, it is hoped, operate in a de-politicized way across administrative boundaries. In other cases, centralized states attempt to allocate waters from a central agency (such as IRSA) according to nominal quotas, but often by de facto fiat. Federal systems appear to require the maintenance of administrative boundaries as a unit of decision-making, necessitating instruments such as inter-state compacts that are comparable to international ones, with the federal government as a sometimes relatively weak go-between and enforcer.

The situation is particularly difficult in Pakistan, where the central government has frequently pre-empted provincial authorities, severely attenuating the ability or desire of provinces to make and observe long-term commitments to each other.

In India also, the re-organizations of states on linguistic lines and due to political considerations have opened up new water disputes between states. This could hamper development activities in the newly created states of Uttaranchal, Jharkhand and Chattisgarh and also open up new water disputes. By contrast, in Nepal and Bangladesh, at this point, the main conflicts appear to be inter-sectoral, and not between upstream – downstream users.

5.3. Technical Versus Democratic Approaches: Problems With Both

Both the technical and the democratic approaches have their strengths and weaknesses. It is best to try to find a working synthesis. A technically informed democracy is necessary, but it may not be sufficient.

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The classical technical approach finds few defenders these days, except among experts and those dependent upon their largesse. The cited limitations are legion:

- (1) Technical solutions do not solve problems that are obvious to stakeholders, and are notoriously subject to the law of unintended consequences;
- (2) Experts may seek to optimize objectives that not all stakeholders agree to in practice (e.g., equity, system-wide efficiency);
- (3) Information is always incomplete, especially on conditions at the field level;
- (4) Decisions are often based on a consensus amongst specialists who have professional or political or regional biases or an economic stake in certain kinds of outcomes (e.g., engineering works);
- (5) The decision-making process in an “experts know best” system is usually far from transparent, leaving the door open to corruption;
- (6) Opposing views by local interests and others are commonly dismissed as uninformed or politically motivated, or both;
- (7) Judicial reviews requires judges to have a high technical capacity and objectivity – where these are missing or compromised, such reviews lack credibility; and
- (8) Since resort to courts is time- and money consuming, with uncertain results, its primary function to litigants is as a threat to potential defendants.

In Pakistan, technical authorities have taken decisions on Indus River allocations with waning credibility. As noted, there was a disturbing trend to move in the opposite direction from democracy and decentralization in making emergency allocations during the 2000 - 2002 drought. As long as emergency responses remain strictly for extraordinary situations, they may not set an unhealthy precedent. Yet, the failure to evolve coordinating mechanisms among the provinces or other mechanisms to solve allocation problems at lower levels is not a hopeful indicator.

Because of recent revolutions in communications and “retail politics,” democratic decision-making, based on or manipulating popular perceptions, is becoming more

common across the world. Democracy tends to check flagrant abuses of power, and makes politicians and bureaucrats more sensitive to needs and perceptions of the people. It also allows the growth of civil society (social capital) that can provide valuable horizontal linkages and assume much of societal governance.

Nonetheless, democracy has a number of notable limitations: (1) The masses don't always trust the experts, even when they should; (2) The dominant discourse can be swayed by “Us-versus-them” arguments, demonizing the other (demagoguery); and (3) Issue linkages may make it difficult to isolate and deal with sectoral problems (such as water allocation) – e.g., economic, military, or cultural clashes produce a climate of distrust that makes “concessions” on water impossible.

During the Wrap Up Conference for this Study in February 2003 at Islamabad, a senior technical expert and a politician provided illuminating insights on the relative roles of experts and politicians in a constructive engagement. Both had participated in the process of the Indus Water Accord of 1991. Engineer Khalid Mohtadullah, then Member, Water, WAPDA, said that agreement on the accord would not have been reached if the politicians had not been provided an interactive tool in the shape of the Water Sector Investment Plan of 1990. This allowed them to game various development scenarios for their respective provinces. Mr. Shah Mahmood Qureshi, MNA, then Punjab Minister for Planning, said the only reason for the validity of the Water Accord more than a decade after it was entered into was that politicians from all four provincial governments had signed off on it.

The empirical studies of Wolf (2001) and others at a global scale support the contention about the tremendous resilience of accords entered into and institutions established during windows of opportunity. He argues that the challenge is to get ahead of the “crisis curve”, to develop institutional capacity and a culture of cooperation in advance of costly, time-consuming crises that in turn threaten lives, social stability and ecosystem health.

5.4. The Interaction of Scales: Fractals and Bargaining Models

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We propose the hypothesis that conflicts are “fractal,” i.e. similar in character at different scales, but likely to be more severe at the local level. Sometimes this leads to adverse effects on conflicts at higher scales. In many cases, if conflicts are effectively addressed at the local level, it may mitigate conflict at higher levels.

In negotiating with the Federal Government and Sindh over the allocation of floodwater canals, for example, the Government of Punjab must keep in mind the disparate interests of farmers in Southern Punjab and prospective settlers in Thal. The recently sanctioned mega-projects for floodwater canals in Punjab, Sindh and Balochistan will operate only 70 days in the year, allowing seasonal cultivation. However, the seepage from these canals and their command areas will augment saline discharge downstream, particularly in Rahim Yar Khan district.

Whether or not the character of water sharing conflicts is fully fractal (replicated at all scales), it may be possible to trace linkages from very local issues to bargaining positions and conflicts on very large-scales. As the U.S. Congressman Tip O’Neill was fond of saying “All politics is local.” Or, as Robert Putnam has pointed out (Putnam, 1992) those who negotiate across borders must simultaneously negotiate and form supporting coalitions internally. In negotiating with Bangladesh over the allocation of the Ganga (Ganges), the central Indian government had to take into consideration the disparate interests of Uttar Pradesh, Bihar and West Bengal. Dipak Gyawali (1998), for example, claims that the “continued withdrawal of Ganga waters by upper riparian states such as UP would be a threat to Bihar’s own construction-focused water establishment and its ambitions towards new deployments of ... technologies”. West Bengal supports diversions from the Farakka to oblige those who have an interest in maintaining the existing silt-prone harbor facilities.

It is equally feasible that local conflicts may be displaced upwards. In Sindh, water applications per acre are well in excess of those in the Punjab, due in part to the predominance of large absentee head-ender landlords in Sindh who have little incentive to apply water sparingly or to give much thought to ensuring that allocated water flows to politically less potent tail-enders. Instead of addressing the problems of efficient use and

equity of distribution, it is easier to rail against diversions of the Indus in the Punjab or even call for a revisiting of the Indus Water Treaty with India.

5.5. Inter-sectoral Conflicts

Inter-sectoral conflicts tend to be more salient at local levels. However, in Bangladesh and Nepal, they may take precedence over upstream – downstream and inter-basin conflicts, even in discourse at the national level. In analyzing the conundrum of inter-sectoral conflicts, Gyawali sees three proclivities at work: that of the profit-inclined market (for example, shrimp and rice farmers), that of egalitarian conservation efforts (preserving the habitats), and that of a regulatory solidarity that can adjudicate between the conflicting claims (the government mechanism). How a balance is struck really depends upon the perception of fairness regarding the regulatory body, the space for dialogue between contending claims, and the innovative ways of transcending the impasse that it can bring forth from the discourse.

If the government mechanism is seen as leaning too heavily on the side of the profit makers, conflict and impasse is inevitable. If it is able to bring forth a solution that fully pleases no one but partially is something no one can ignore, an impasse may be avoided and a "circle of improvement"ⁱ may be initiated.

5.6. Proper Valuation of Water, or Valuing the Service of Delivering Water?

The proper valuation of water, and the allocation and enforcement of water rights, may reduce the contested space, but faces a number of conceptual and practical difficulties. A transparent pricing of water is possible where there is a documented economy with a fair and just adjudicator. It is not possible where the economy is informal and the regulatory bureaucracy essentially rent-seeking. Several issues of valuation come up for consideration, when one looks at water within the broader social context.

There is a difference in valuing water and valuing the service of delivering water. The former is difficult because of multiple reasons, the most crucial of which are the different

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properties of water that is put to different uses. Some of them are of such symbolic importance that attempting to place a price on them would be considered sacrilegious. For example, water at a religious site would be considered holy (bathing ghats near temples) and would require certain properties of flow to be maintained. It cannot be substituted by tanker-supplied water. The latter is easier to measure, allocate and hence price to the satisfaction of all. Therefore the debate over water tariff would be quite different if it was seen as price hike of water on the one hand, and on the other, admitting that water is a "human rights" subject of egalitarian concern, but that the delivery of water has a cost associated with it that needs to be met.

5.7. Mechanisms and Principles Used in Addressing Conflicts.

Several mechanisms and principles have been adopted and applied in South Asia for dispute settlement. Some have yielded excellent results, while others have caused continuing rancor and legal battles in the courts. The following is a broad categorization of these instruments:

- a. Negotiations [for example through Standing Committee on Inter-State issues, MOWR, India];
- b. Tribunals [India, Pakistan];
- c. Formulas for sharing excesses and shortages [Indus Basin Water Accord, 1991];
- d. Equitable distribution [Ganges];
- e. Benefit sharing as opposed to water sharing [Rajasthan, a non-riparian beneficiary of Narmada].

The principles of equitable distribution of water availability assessed at agreed locations on the main river or its tributaries (on 75% dependability or average availability) have been generally followed in the Inter-state water disputes. The Helsinki Rules on equitable distribution (GOI, 1999) and now the UN Law on Non - Navigational Uses of International Watercourses are widely referred to (UN, 1997). However detailed authoritative guidelines for the application of the "equitable and reasonable utilization" principle are yet to emerge in South Asian countries. Efforts are at hand in India to evolve such guidelines. The National Water Board under the National Water Resources Council, in its meeting held in August 2002, decided to constitute a Working Group

chaired by the Chairman of the Central Water Board. It is expected that these policy guidelines, when finalized, would expedite resolution of interstate water disputes.

In South Asia, ground water resources have generally not been taken into account in the assessment of basins' water resources for distribution or sharing among the riparian provinces or States. However, each State within an Inter-state basin has the right to use the ground water resources for beneficial purposes. The law on ground water is still evolving. In India, Authorities are in the process of being established in the States on the basis of guidelines prescribed by the Central Government, which has established the Central Ground Water Authority.

A change of State boundaries due to the re-organization of States is an issue particular to India. It has brought even past agreements in dispute (Mohile, 2000), and resulted in the establishment of additional Tribunals to settle the sharing arrangements.

Specific trans-basin diversions are permitted in provincial or Inter-state Agreements and Tribunal Awards, but not as a general rule. Each basin State is free to use the Inter-state basin water allocated to it in a general sharing arrangement, or on specific projects, and regulate within its boundaries, to enjoy the benefits of that water within that State in a manner not inconsistent with the specific agreements or orders of the Tribunal or the Agreement. Invariably, a formula is specified for sharing of excesses or shortages in any water year over the allocated shares. The percentages of return flows are usually also accounted for in working out water assessments and sharing.

Non-riparian States have been allocated water for utilization for drinking water, irrigation, and other beneficial uses on the basis of Agreements of the riparian States considering the established water shortages and hardship in such States or towns or cities. A review period for Water Accords, Tribunal Awards or Agreements is usually specified.

5.8. The Settlement Process

An appreciation of how, in the past, the settlement process has worked in India is given below.

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Over 125 Agreements have been evolved on the sharing of Inter-state River waters or on specific projects. All these agreements have used the negotiation route, with the Central Government playing the pivotal role under the Constitutional Laws, Acts, and Statutory Rules. Most of these Agreements have worked well since they were done with the willing consent of the Party States to the Inter-state Basin.

Inter-state statutory organizations for specific projects or basins have been set up under the Central Government with the participation of the basin States and beneficiary States with defined roles (Char, 2000). These have been set up either by mutual agreements or under the direction of the Tribunal Awards. Inter-state organizations have also been set up by mutual agreement of only two States without Central Government participation. The dispute settlement mechanism prescribed under Article 262 of the Constitution has been used under specific reference(s) made by the States for settlement of disputes under the provisions of the Inter-state Water Disputes (ISWD) Act. The Tribunals have taken a long period to settle the disputes referred to them, and some have been unable to give the Award for over ten years for various reasons.

Even after Awards were given, the issue of people affected by the project, and non-consultation with the Stakeholders in the planning process, has stalled implementation. This has resulted in the Supreme Court intervening in the Public Interest Litigations (PILs) filed by the NGOs and affected Parties. The States reopened even settled issues such as the height of the dam (Char, 2000). Scheduled resettlement and rehabilitation Plans are delayed or interrupted by the States where major part of the submergence falls, even though the Tribunal has given specific instructions to follow. The Tribunal has not suggested corrective steps in such cases and the Implementation Mechanisms set up under the direction of the Tribunal have lacked adequate powers.

The setting of a date for the reopening for review of the water sharing awards given by the Tribunal has opened up a race among the States to implement projects in a haphazard way to establish prescriptive water rights on the particular date. This has led to overreaching project-agreed provisions of storage, resulting in serious disputes between

States. This has led to litigation being filed by the aggrieved Parties in the Supreme Court for adjudication.

Water being a 'State Subject' the role of the Central Government in India is limited. Modifications in the Statutory provisions have been debated, but no tangible solutions have been possible.

It is increasingly being recognized that maintaining a certain minimum flow in the rivers during the lean season months for ecological considerations is necessary, and provisions have been made for the same in the new agreement (Upper Yamuna) and treaty (Mahakali Treaty) signed in recent years.

Since most of the river basins of India are Inter-state in character, the Central Organizations viz., the Planning Commission and the Ministry of Water Resources with its technical attached organization, the Central Water Commission, have exercised a very well set schedule of techno-economic clearance guidelines in approving the Inter-state projects planned by the States for implementation under the Five Year Plans. This procedure has been institutionalized, even though it is time consuming. This route of clearance ensures that projects on the Inter-state rivers are not taken up without an agreement on water sharing in general, or project specific sharing in particular, of the waters of the river basin. There is a loophole in this, since the clearance is required only if the State wants Central Plan funding for the project. Otherwise, the State can go ahead with the project if funds are not a constraint. In that case, the aggrieved States can seek judicial intervention to stop the project.

5.9. Implementation Problems

River water sharing conflicts are frequently more emotional than technical, and not always based on needs. In India, water is one of the three most emotional issues --- the other two being religion and language. The likelihood of success in resolving such conflicts depends on the particular situation.

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The political system of India is based on a multi-party democracy. Every political party gives a top slot to water resources development in its election manifesto. Almost every candidate contesting the elections promises a water project to his constituents. The actual availability of water is immaterial to the promises made. Non-availability can always be attributed to someone upstream, who can be shown as having appropriated all the water, thereby setting up a conflict. Water is an easily exploitable expedient in electoral politics.

The potential for conflict has always existed historically. However, immediately after independence (1947), the resultant euphoria, nationalist fervor and the quality of political leadership facilitated negotiations, and the many agreements on water sharing in a spirit of mutual accommodation and in the national interest are evidence of this spirit. Over the years, this spirit has changed to rigid postures. State level leaders argue that the national interest is synonymous with State interest, and vice versa. The downstream States have pleaded, and even the Tribunals have conceded, that ground water should not be a part of the water resource sharing arrangement - a technically non-sustainable plea.

Even though every political leader concedes in private that river water development should be the National Government's responsibility, the same leaders take a diametrically opposite stand in public - "Water is a State property and the Center should not interfere". Every leader swears by Integrated Water Resources Management in private, while stating in public "Give us our share (meaning all the water demanded). We know best what to do." Given the political environment, the River Basin Organizations, which could have really put basin planning, development and management on the optimal path have not been made operational, for reasons that are never clearly stated.

Negotiations are an important and basic technique of the alternate dispute resolution procedure, but are proving less and less acceptable as a means of providing solutions to water sharing. Currently, even the Tribunal Awards, which have the backing of the Constitution, are floundering in the face of interminable interpretations and legal court battles.

5.10. Changing Conditions and the Nature of Water Conflicts

Globalization and the WTO

Crow (1998) argues for new forms of water cooperation across South Asian borders. In addition to diplomatic negotiations, which are limited to bilateral barter between governments, he suggests that monetization of benefits with corporate sector participation could make cooperation easier and increase the range of issues that could be negotiated. International and inter-state trade in water yet remains anathema for most developing countries and provinces owing to insecurities over sovereignty and autonomy. However, as world trade in commodities has doubled from three trillion dollars to more than six trillion dollars during the last decade, it is clear that countries are trading water more and more, mostly in the guise of trade in food items and agriculture raw materials. One ton of grain requires on average a thousand tons of water to produce.

WTO agreements have a number of implications for water security. The most obvious include the greater range of options for meeting national food security targets while adopting cropping patterns that are responsive to international comparative advantage as well as agro-ecological sustainability in each region of the country. The risks include heightened exposure to price fluctuations in world grain and other agriculture commodity markets for farmers that already suffer owing to the inevitable lag in any production response to national gluts and shortages.

The nature of urban water demand can also change much more rapidly under conditions of globalization than planners conventionally envisage. At the height of the carpet and garment export boom, for example, Kathmandu experienced severe water shortage as most carpet washing and garment industries were located in the valley. Given the downturn in these industries, the crunch has not been as bad. If there were a shift in the economy and, say, more north Indian tourists started visiting the hills to beat the summer heat in the plains, the nature of the demand on water would change significantly, to one favoring swimming pools and water parks. While it makes sense to locate such industries where there is surplus of water, the overall economics of building infrastructure

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discourages such efforts. Hence there is potential for inter-sectoral conflicts even within urban areas.

In none of the 30 agreements drawn up by the World Trade Organization (WTO) is there any explicit mention of water. Yet the commercial sectors associated with water (provision, distribution, management and so on) will no doubt be affected by multilateral commercial regulations, particularly those laid down by the GATS, the General Agreement on Trade in Services. In principle, public services are not covered by the agreement if member states wish to protect them. In practice, the influence of GATS on economic activities related to water could be huge, as its coverage extends to 12 categories of services, including environment, energy and distribution. Once a state decides to open up its water market to competition, it relinquishes the option of reversing the situation. On the other hand, it will be difficult to evaluate the full effects of liberalization in the short term.

Changes in Economic Structure

The urban growth rate in South Asia, as in other developing regions, is much higher than the rate in rural areas, both in terms of population and economic development. As a result, the demand for new supplies of water is a crucial aspect of urban politics within the national scheme of things. Because information regarding choice of technology and the implied resource allocation is known better in urban areas (and within the small bureaucratic coterie that makes these decisions) than in rural areas, the decisions are often biased against the rural areas. Hence there is a water conflict regarding the transfer of water from rural to urban areas that is reactive rather than pro-active between urban areas and their rural hinterlands.

A significant example is the Melamchi project, which envisages transferring water from this river north of Kathmandu to the capital city through a 27km tunnel, in the process affecting rice production as well as small scale power generation in the Melamchi valley downstream of the intake. It is a multi-year, multi-donor project that has the potential of pitting the capital city against the villages not only in the Melamchi valley, but also in other areas of Nepal (Moench, 1999). This is because the project would soak up most of the Government resources that could be spent in the water supply sector, i.e. the development agency loan will have to be paid by the whole country (including lack of availability of more development loans), when the benefits are only going to accrue to Kathmandu. The nascent activism against such projects is centered around equity issues as well as those of conservation: in a scenario where urban water supply leakage can exceed 40%, would it not be better to plug the losses than to create new supplies?

Recognition of poverty and gender issues

South Asia’s poorest people – especially women – are the hardest hit by the sharpening scarcity of water and the lack of sanitation. Almost certainly it is the poorest that comprise the 11% of South Asian population without access to safe drinking water, while the 63% without access to sanitation are largely the poor along with the lower-middle income group (HDSA, 2002). Where the poor do get access to safe drinking water, it is frequently at a price many times more than their rich brethren pay.

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In most rural areas of South Asia, women make a significant contribution to planting and caring for crops and livestock, and throughout South Asia, women have the primary responsibility for cooking food and fetching water. For millions of women in the region, fetching water is a strenuous daily chore. In many arid and semi-arid zones, women may spend a significant proportion of their time fetching and carrying water. For example, in Tharparkar, Sindh, many women and girls walk for hours every day to fetch water for their family needs. This burden gives rise to chronic health problems. The Thardeep Rural Development Program (TRDP) and other NGOs are promoting rainwater storage tanks. Where the program has not yet reached or when the tanks dry up, Thari women queue at the wells for hours, often setting off in the middle of the night in order to save time on queuing. After such energy sapping, time consuming activity, there is little scope for school and vocational training, and for personal development and economic independence. Yet, as noted by TRDP, a prolonged drought may reduce both the utility of, and the paying capacity for, domestic water storage tanks (TRDP, 2001).

The lack of private sanitation can be an acute problem, especially for women and girls who live in poor and overcrowded urban neighborhoods or in large villages. Many millions of women have to wait until after dark before going out to defecate. Many bathe themselves and wash their clothes in canal and rivers – upstream from their own latrines but downstream from the many other sewage outlets discharging into the waterways of South Asian cities and villages.

What is common to most such situations across South Asia is the absence of women from water and sanitation management forums. Thus the ‘conflict’ is doubly suppressed by cultural acceptance and women’s lack of voice. Some progressive projects, including the second phase of the Punjab (Pakistan) rural water supply and sanitation project, are seeking to make a change. For excellence in the pilot phase of the project, the President of the Asian Development Bank has given awards to a woman president of a village community organization and a women community motivator, who supported the formation of the village water and sanitation committee not dominated by male office bearers (ADB, 2002).

Other Areas that should be addressed

A number of areas are inadequately covered, both in this study, and more generally in the development of policies in South Asian countries. These include traditional water rights, groundwater, and the environment.

Traditional Water Rights:

There is little generalized knowledge about the role that traditional water systems and rights play in aggravating or mitigating conflicts in South Asia at the current moment in history. The few case studies that exist display an intricate connection.

In Nepal, for example, many traditional systems such as ponds, *dhungey dharos* (stonewater spouts), or Raj Kulos are becoming defunct or deteriorating under the impact of modernization. The religious bathing *ghats* have also suffered a similar fate, and many traditional structures have been severely encroached upon. However, with the assertion of rights over public space through what is known as identity politics, groups have begun to take initiatives to reclaim the public space back. This has meant a more pleasant environment but has also at the same time created the space for unpleasant conflicts as this assertion takes place. The traditional ponds of Kathmandu and the pollution of rivers in bathing *ghats* are such sites of activism and conflicts at very local levels.

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Groundwater:

Groundwater depletion and contamination are well known physical phenomena in specific basins of South Asia. For example, the water table is dropping by as much as six feet per annum in parts of the Quetta Valley, and the discharge of tannery wastes is poisoning the groundwater near Kasur, Pakistan. As fresh groundwater is drawn down through increasingly deep and powerful pumps, saline water intrusion is a looming threat for agriculture and drinking water supplies in other inland and coastal regions.

Arsenic in groundwater drinking supplies is recognized as a major threat to human health in Bangladesh. It is also acknowledged that across South Asia laws and regulations governing the use of groundwater are less developed and weakly enforced compared to those for surface water. What are the conflicts that arise, how are they resolved, and what are the implications for policy? Janakarajan (1999) notes at the conclusion of his able survey of conflicts over groundwater in Tamil Nadu that accountability is at the core of addressing problems of overexploitation, that it is of paramount importance to devise legal measures that enforce the polluter pays principle (PPP). The questions remain, accountability to who and how, and how to enforce PPP? These are the open issues that call for systematic and experiential learning.

Environment:

With the growth of modern lifestyles and industries, watercourses are increasingly used as drainage outlets. Often, the use of the "flushing" property of water impinges and overwhelms the "life support" function of water, such as sustaining aquatic, terrestrial and human life, through degradation of the water body. There have been conflicts across South Asia related to pollution by factories and even municipalities. There are an increasing number of scientific studies assessing degradation in ecosystem functions, loss of fisheries and other living resources, and impacts on the health of downstream users. How are these conflicts articulated, mediated and perhaps resolved? A great deal more needs to be learnt from the emerging best practices in the region and outside.

6. RECOMMENDATIONS

The preceding chapters have shown that the water crisis in South Asia is mainly a crisis of governance, and not mainly one of scarcity, we make recommendations for policy reform and institutional development. There is also scope for innovation and its diffusion, but such technical changes should take place within a rights-based approach that seeks to include rather than further marginalize the poor.

6.1. Getting Ahead of the “Crisis Curve” within Countries

Procrastination in settling water disputes does not pay. The challenge for South Asian countries is to get ahead of the crisis curve, to develop institutional capacity and a culture of cooperation among central and provincial governments, sectors and users in advance of costly, time-consuming crises that in turn threaten livelihoods, economic stability and ecosystem integrity.

In all four countries, getting ahead of the crisis curve entails de-politicizing water conflicts, taking advantage of the strengths of democratic institutions, while containing their weaknesses. There are four possible routes to achieving institutionalized cooperation:

- Strengthening existing institutions and conflict resolution mechanisms;
- Establishing bargaining arenas for settlement of disputes between state or provincial governments and for subsequent management of water resources;
- Establishing integrated river basin (sub-basin) management; and
- Establishing economic cooperation forums for water negotiations and management.

The four routes, like the channels of a braided river, are not mutually exclusive but distinct. The choice or blend that is appropriate depends as much on the vision of the leadership in each country as on the traditions and past forms of governance and management culture.

Strengthening Existing Institutions and Mechanisms

The existing institutions in South Asia for settlements of water disputes consist largely of courts, special tribunals, river control boards and water development authorities, other forms of departmental administration, alternate dispute resolution mechanisms such as negotiations and mutual discussions, and political caucus. The instruments are judicial and semi-judicial awards, administrative decisions, and inter-governmental accords. They are basically various types of hierarchical organizational structures characterized by conventional top-down decision-making. As such, this route may be called the continued centralization model.

In India, for many years after independence, the process of negotiations was successful in conflict resolution in many cases. However, in recent years, negotiations have not met with much success. Currently, even the Tribunal awards, which have the backing of the Constitution, are floundering in the face of interminable interpretations and legal court battles. Still, given the country’s present political system, adjudication by tribunals appears to be the best mechanism for solving inter-state water sharing disputes, if these can not be settled through negotiations, with or without assistance from the Central Government within a reasonable time frame. The mechanics can be streamlined, as shown in **Figure 5**.

In Pakistan, the Balochistan Ground Water Rights Administration Ordinance (1978) is another top-down legislation that empowers the Governor or Chief Minister of the province as the sole authority to give permission for sinking a new tube well. This concentration of sanctioning authority has not acted as a restraint to groundwater mining in this water-scarce province. In fact, giving the permission to bore a new tube well has become a form of political patronage.

Establishing Bargaining Arenas

The essence of the Bargaining Arena (BA) model is that it represents a compromise between the extreme of top-down decision-making mentioned above and the other

extreme of bottom-up voluntary cooperation, as illustrated by the Alwar villagers' "river parliament". The model consists of two types of actors: the central authority and interest groups represented in the bargaining arena. There are important differences between direct government regulatory intervention, voluntary cooperation and the bargaining arena model. In the first case, there is only a direct link between the controlling authority and each stakeholder; in the second case, there is no outside controlling authority. In the BA model, the central authority has enforcement power that is needed at different stages, to get the stakeholders to make plans and to implement them. In the case of lapse or default, the controlling authority has binding powers. The controlling authority uses the BA model instead of direct regulation, because the stakeholders know more about the situation on ground, and in order to minimize bureaucracy and political decision-making. **Figure 6** illustrates the linkages between planning nodes across sectors and levels in the BA concept.

In Pakistan, the Indus River System Authority (IRSA) was set up in 1992 as a bargaining arena between provinces to implement the Water Accord of 1991. It has had a turbulent history only because on three separate occasions, the controlling authority decided to over rule or by-pass IRSA for short-term reasons. The fact that IRSA has survived its first decade through periods of political expediency and emergency related to drought conditions, however, speaks for the basically robust nature of such an arrangement.

Similarly, some of the local level conflicts in Nepal, such as those brought to the fore with the revival of traditional systems, can be managed at the local level through decentralization or devolution. Higher-level State institutions can be maintained as courts of last resorts rather than parties to the conflict.

Establishing Integrated River Basin (Sub-Basin) Management

As noted in Chapter 2, there are two archetypes of river basin management, the authority model and the coordinative model. The authority model has the same features of hierarchical top-down decision-making as discussed in the first approach above. The coordinative model reverses the bargaining arena concept. A cooperative body of Federal

and provincial governments is established at the apex to set policy, while an authority or commission supports and executes the council’s decisions. In so far as it is the operational aspects of river basin management that require quick decision-making, this arrangement makes sense. The Murray-Darling model is an example of a consultative ministerial council with oversight of a commission with executive authority. However, to work well, such a river basin governance model requires a mature and serious political culture.

In India, even though the River Board Act is a statute, its use for the purpose of Basin planning of Inter-state Rivers has not materialized due to the very nature of the Act being advisory. Even after the water allocations among or between the States for Inter-state rivers are made, the planning process for integrated development of the river basin with due regard to all sectors of water needs has not matured. Several recommendations in this regard need to be acted upon.

River Basin Organizations (RBO) should be set up for ensuring integrated development of River Basins. The National Commission for Integrated Water Resources Development Plan (1999), which had also gone into the various legal and institutional frameworks in India, recommended the enactment of a new “Inter-State Rivers and River Valleys (Integrated and Participatory Management) Act” under Entry 56. The recommendations of the NCIWRP are under consideration by the Government. This Act needs to be taken up for enactment in the light of the revised ISWD Act, 2001, taking due cognizance of the participation of stakeholders.

A Framework for a River Basin Organization is given in **Figure 7**, which envisages a phased process to achieve integrated basin development. These phases comprise a legal and regulatory framework, State level and Inter-state organizations, and implementation and monitoring. Such RBOs could also be involved with negotiation of Inter-state water disputes, before the dispute is referred to the Tribunal for adjudication. There could be no bar on the Union Government setting up multi-disciplinary RBOs by an executive order. To start with, RBOs may collect and analyze data and prepare plans for Integrated

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River Basin Development for optimal utilization of the water with appropriate sectoral allocations. In the next phase, RBOs could assist the tribunals, and finally, they could be authorized to monitor the implementation of development plans by the State RBOs.

Establishing Economic Cooperation Forums For Water Negotiations And Management

Crow (1998) has argued that the valuation of water resources enables a simpler, more open assessment of international exchanges than is possible with the existing forms of diplomatic 'barter'. The arguments for including new actors from the private sector and for creating new spaces for water agreements holds with equal force at state, provincial, and local levels. While negotiations on water sharing are limited to cases where there is a double coincidence of wants, benefit sharing on a monetized basis can extend cooperation to include unevenly represented interests.

The approach may be illustrated with a case from Pakistan. Ahmed and Kutcher (1992) argue that water can be profitably traded between water surplus and water short agro-ecological zones in Punjab and Sindh, now that the Water Accord has established the shares of the provinces.

Ground water, according to Indian Law, is defined in terms of the Indian Easements Act (GOI, 1882), under which the ownership of land carries with it the ownership of the ground water under it. As a result, this huge resource is not regulated due to political problems and the legal problem of easement rights. The Supreme Court has directed the Ministry of Environment and Forests to set up the Central Ground Water Authority and frame rules for the regulation of ground water. The Authority has been set up and the draft "Environment Protection Rules for Development and Protection of Ground Water" have been framed and circulated to the States for immediate action.

State Governments need to act expeditiously on the Rules. Legal remedies have to be found for priority allocation of ground water to meet drinking water needs, and to prevent over - extraction for other uses. In a fast changing scenario, where the committed irrigation releases may have to be diverted to different needs like drinking water,

industry, environment, etc., with better economic value and opportunity costs, the existing user may be given a 'limited legal right' to the transfer of such right, temporarily or permanently, to another user who may be prepared to pay more for such use.

6.2. Get More Crop Per Drop

There is still considerable scope worldwide, and especially in South Asia, for producing more grain with less water. The International Water Management Institute (Molden et al., 2001) applies water accounting procedures to bear on the productivity of various uses of water in a basin. The strategy is to realize real water savings and to produce more agriculture output with the same amount of available water. As against (a fairly optimistic) base scenario that requires a 29% increase in the world's irrigated area and a yield increase of 38% over a 30-year period (1995-2025), the more crop per drop scenario envisages a 76% yield increase to meet the world's food and nutrition requirements.

In the specific case of India, an approximate doubling of yields from 2.7 t/ha to 4.7 t/ha would eliminate the need to divert or draw up more water for irrigation than at present. The key measures include changing to new crop varieties, switching from high water – consuming crops to crops with higher economic productivity per unit water, precision irrigation that reduces non-beneficial evaporation, better timing of supplies to reduce crop stress, and improved non-water inputs that work in association with irrigation (Molden 2001).

Pakistan, with wheat yields averaging 2.3 t/ha, can go a long way to improving yields per unit land and water by rationalizing water allocations across canal commands within provinces according to (Hussain et al., 2000). Irrigated wheat yields vary from 0.5 t/ha to 5.4 t/ha across a random sample of 1,220 farms located in 14 canal commands of the lower Indus Basin in Sindh. The authors argue that shortage of irrigation water in some canal commands and poor land quality in others are the two fundamental constraints. The marginal productivity of irrigation water varies significantly and immediate productivity gains could be achieved by effective reallocation of water across canal commands.

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Another way to improve water productivity is to shift emphasis from large-scale development of water resources to more local-centered management of existing supplies. In principle, lining distributaries and watercourses could save about 10 MAF. Experiences in lining watercourses with bricks over the past few years have not proven effective, however, as they leak. New lining materials may show more promise, but only if they are accepted and installed by the community.

Much water can be saved through the modest leveling of farms and change in irrigation practice from flood to furrow irrigation. Tube well irrigation could be combined with low-head sprinkler and trickle systems. Investment in farmer education for water saving would almost certainly yield high returns, especially if combined with improvements in conveyance systems to ensure timely and predictable deliveries. To be fully effective, a number of these improvements, especially those that bring water to the farm, require organization and mobilization of the irrigation community.

Sugar cane is a water intensive crop. Is it the right crop for largely arid and semi-arid Pakistan, especially when sugar can be imported at lower prices from countries with climates more conducive to higher productivity? This is a question that the economic and agriculture sector policy makers need to address.

6.3. Focus on the End-user

Apply empowering technologies

Local reservoirs and village tanks are an integral part of some irrigated South Asian landscapes. They are an essential part of the survival strategy for farmers and households in semi-arid rain-fed regions. Surface and ground reservoirs can increase the options for irrigation and drinking water for farmers and households in perennial canal irrigated zones with suitable soil and groundwater conditions. Unlike large reservoirs on rivers that will inevitably silt up over time, local ponds can be de-silted and groundwater recharged

and used in perpetuity. A vision of dispersed and reliable local surface and underground storages needs to replace the dream of large dams and reservoirs.

Modern communication technologies also show much promise for improving the quality of information to communities as well as to system operators. For example, the installation of automatic gauges with computerized telecommunication linkages at critical locations such as reservoirs, barrages and points of release along major canals can enable monitoring of real-time data. The widespread use of satellite communication systems and relatively inexpensive reception systems can also allow this information to be shared with parties throughout the command area, allowing them to provide superior mass supervision of water releasers, and to make wiser cropping and watering decisions.

Build Capacities of Water Users Organizations

South Asia has at least three decades of experience with single - purpose water user associations. The results have not been to the level of initial expectations. We suggest that the problem is with the approach adopted.

Until the Mona experiments by Lowdermilk et al. (1978), Pakistani national policy makers were not aware that watercourse losses far exceeded the total amount of water stored at the just completed Tarbela dam. The low cost physical solution was brick lining of the watercourses. A notional level of farmer involvement was sought, mainly to reduce the burden on the provincial exchequer, and to make the program more palatable to donors. The watercourses of influential farmers in single Biradari situations were targeted. After three decades of effort, the head sections of around one-third of the watercourses in the Indus Basin have been lined. Already, the cracks in the brick lining and a dried under-bed have meant that losses in many watercourses have reverted to the situation before lining. The large farmers have often found that they could not exclude the cattle of the poor from wallowing in the watercourse and damaging the berms. Without social cohesion, farmers in their individual interest are also prone to making unauthorized outlets at night, further destroying the lining.

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Direct assistance to the target communities had the charm of tangible results in a defined time frame. However, it led to the common error of a one-sided focus on project objectives. It meant that not enough attention was given to the requirements of the implementing community, and to its operational context. The risk that project results would not be sustained was naturally high.

It is argued that attention should shift to building the capacities of the involved farmers' organizations, to strengthening the relations between local organizations, and embedding of specific project activities within these organizations. In addition to specific programs and projects, intermediate development support organizations would also become a focus of such an approach.

Some elements of capacity building for local irrigation management are:

- Enhancing the skills of individual farmers in water measurement, record keeping, and communications, perhaps changing their passive and defeatist attitudes in the process of empowering them with such skills;
- Irrigation farmers may be profit-maximizing individuals, but they are not necessarily bound together in an organization for the management of a common water supply. Strengthening farmers' organizations through the discipline of regular meetings, emerging rules and guidelines for governance, and rising savings for water management, is a strategic investment. Key tools include problem visualization and conflict resolution skills. Community animators with these skills should be identified and empowered;
- Finally, it is essential to create networks of co-operation between different farmers' organizations, and enhance co-ordination among their activities in order to scale up water management programs and to sustain their impacts.

Human and institutional development efforts should also focus on intermediate organizations, such as local government, co-operatives, industry and professional associations, training institutes, intermediating NGOs, community organizations and interest groups that provide support to farmers' organizations.

How would this approach help solve, for example, Pakistan’s “big” irrigation problems? Assume that a decade of concerted effort could result in the transfer of all 3,000 distributaries to effective and efficient Farmers’ Organizations that collect abiana (water rent), maintain local infrastructure, and pass on 40 – 60 % of enhanced water charges to Area Water Boards. The Provincial Governments could anticipate receiving enough revenue for proper operations and maintenance of major irrigation infrastructure as well as make provisions for trunk drainage. Management change would be more practical and feasible for provincial irrigation departments with mandates focused on trunk infrastructure.

Farmers would pay more for water, but less to officials as bribes. It is an open question whether their net outlay would be greater or smaller. Certainly, the time that farmers spend in defending against charges of breach of irrigation rules or in seeking redress would be much reduced. Higher water price would be an incentive for technical innovation, such as investment in low head sprinkler or drip irrigation based on tube well water stored in a tank at modest height. Higher price would also be an incentive for institutional innovation, such as water trading, and will provide an incentive for crop substitution towards lower delta crops.

All three sets of innovations will reduce the total demand for canal supplies. They also imply more timely application of water in relation to plant needs, and should boost rather than restrain the growth in productivity. A reduced demand for water across the Indus Basin will ease much of the intensity of inter-provincial water allocation disputes. It will also reduce the drainage burden and the emerging provincial disputes due to trans-provincial flows of saline effluents.

Address Inequities of Landholding Where Needed

Some regions of South Asia have experienced effective land reforms, while others have not. Equity in access to land, water and other natural resources is important for sustainable use. It is also necessary for successful innovation diffusion, as the following example from Pakistan demonstrates.

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In NWFP, where most of the clientele of the On-Farm Water Management Program are small owner-farmers, it has been possible to collect up-front the farmers' contribution for the renovation of common watercourses and 96 per cent of the amount due has been recovered. On the other hand, in Sindh, with skewed landholdings, large farmers have captured the program and only 20 per cent of the amounts due have been recovered (Halcrow, 1996).

A one-time land reform may not be enough if economic processes cause sharp inequities to emerge again. In Bangladesh, the conflict in water sharing between farmers and fishermen can be addressed through policies of social equity, enforcement of committed programs, and genuine participation of people at the grassroots level. A clarification of farmers' rights and community empowerment for their enforcement is a prerequisite for effective land use zoning control of shrimp cultivation in the Southwestern coastal zones.

Reduce Subsidies

Subsidies, resource capture by the elites, the decay of government departments and local conflicts owing actual and perceived inequities in resource allocations and the application of rules, are interlinked phenomena. As Mustafa (2001) has shown for Sidhnai in Pakistani Punjab, *tawan* (collective fine) for stealing irrigation water is seldom enforced in the tracts of land dominated by large landlords, who already enjoy highly subsidized canal water supplies. The first step in departmental reforms and rules - based water management should be to phase out subsidies. It is necessary to collect at least enough to cover the O&M costs of service delivery. Proper pricing will generate the consumer demand for departmental reform and reductions in unnecessary overhead costs.

Provide a Responsive Delivery System

Improved metering systems can make volumetric charges for water more feasible, while providing reassurance to irrigators that they are receiving their water in appropriate quantities at the right time. Communications systems combined with adequate metering and charging systems, should also facilitate wider adoption of demand-driven water release systems. In all of these ways, new technologies linked to information systems can

help more clearly define enforceable rights and improve trust. It is important, however, to avoid as much as possible the appropriation of new information systems by rent seekers and to span the digital divide. It is also necessary to promote the adoption of simple technologies that empower irrigators, even those who are semi-literate.

Ensure the Participation of End Users

User participation is a mantra often repeated, and equally often forgotten. In fact, user participation is essential from the beginning, such as in the design phase of projects. It is equally important for project implementers to be sensitive to variations in local conditions.

Agitated NGOs have asked for an inspection under Asian Development Bank rules of the Chashma Right Bank Canal project in Dera Ghazi Khan, Pakistan, owing to the alleged violation of the Bank’s rules for the re-settlement of displaced persons. In fact, flooding and displacement would not have arisen as issues if the designers had consulted the local farmers on the alignment of the canal. A feasible alignment cutting through slightly higher ground would have saved a tract of land west of the canal from being flooded and causing loss of life in the first year of its operation.

6.4. Establish a Rights-Based Approach

A clear and enforceable specification of water rights will, in principle, improve water use efficiency by creating strong incentives aligning the generation of surplus with its distribution. Because of pervasive rent seeking, built up over time, there is likely to be resistance to clarity of water rights, especially at the lower levels, but that is precisely where the efficiency gains (and therefore the reduction of conflict at both lower and higher levels) are likely to be achieved. To be fully effective, water rights must include transferability.

Three countries in this Study struggle with the rigidities of the colonial 1873 Act that emphasizes central ownership, a top-down approach, and non-transferability. The only

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doctrine of the major ones that allows transferability is appropriationist or historical rights. Clearly, transferability (marketability) requires the costly commitment of resources – e.g., to improved metering, monitoring, registration and enforcement mechanisms – as well as the overcoming of asymmetric power relations between zamindars (land owners), corrupt local officials, and already entitled but under-served end users.

Water resources development has been seen in the past decades as a state-led venture, where many of the losers (oustees, people whose water would be transferred to urban areas etc.) had their rights forcibly taken away by the State using its right of acquisition for what it claimed was the greater good. Often the level of state compensation was seen as grossly unfair. In many cases, a market-based solution (with the state acting as a fair adjudicator) would alleviate many of the conflicts, for two reasons. One, a market-negotiated compensation is less coercive than state acquisition. Two, preserving the State as an adjudicator instead of an adversary in acquisition, keeps the hope alive that a fair deal can be achieved, and hence prevents conflicts from acquiring the status of an impasse.

6.5. Build Capacity by Providing Information and Building Trust

We have demonstrated how the non-disclosure of hydrological data, or the absence or inconsistency of data, on security or other grounds, decreases security by lowering trust and rendering verifiability difficult. Indeed, data is not just a source but a major category of conflict.

Much of the distrust in water conflicts stems from distrust of institutions that collect data, especially if these institutions themselves are a party to the conflict. Issues of pollution or demand forecasting or other aspects of "data" could become resources for the resolution of conflicts if they have been sufficiently "pluralized", i.e. they are collected and verified by multiple actors (which is also good science) at various scales. Only consensus generated through such a process, rather than from single-mission outfits using monopoly

power, will inspire faith in their veracity. This applies to local as well as inter-state conflicts.

Even with disclosure, it may be difficult to generate trust. Water users tend to consider first their own “needs,” defined in terms of recent use or future plans. Sometimes this can be part of competitive status seeking, such as among the Zamindars (landlords) of Sindh cited in IBRD 1996. Consideration of the rights of others requires agreement on what the basis of the rights is, and to accept the legitimacy of formal rights systems as opposed to informal (“water mafia”) ones.

In the absence of clear and agreed upon rights, especially over risk bearing in abnormal years and seasons, open information by itself may not reduce conflict, but become an instrument for political bargaining. Even with agreement, there is a need on the part of users, who often operate with different languages (both national and technical), to understand the limitations on information, which inevitably has certain “biases” due to the exigencies of measurement etc. It is often imperative to recognize that we do not have absolute information about the hydrological cycle or the nature of all uses, and that the situation will only become more complex in the future, without ever achieving “perfect” information.

Agreements that seem to specify allocations quite precisely often in practice are based on imperfect, or even manufactured, information. The Colorado River allocations among lower states were based on the available short hydrological record, which turned out to be a very wet period – hence the first-mover (California) was able to develop an absolute amount that was above its intended relative share. At Lake Biwa, downstream prefectures were given a right to withdraw water in both height terms and lake level, without an indication as to how to resolve probable conflicts between them.

Despite all these problems of information, more open information would appear to be a necessary condition for improved trust, by leading to improvements in the quality of both further information and the nature of the discourse among stakeholders. Hence, mechanisms need to be worked out that can work with imperfect information and

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uncertainty while reducing the possibility of opportunism by all parties. This is easier said than done, but it is critical to try to operationalize such “governance structures” and adapt them to changing circumstances (but not to political winds).

Agreements often deliberately or incidentally distort critical information, notably on available water. It is therefore necessary to find ways to build in resilience and adaptability to new or revised information.

6.6. Rely more on non-governmental approaches

The Alwar, Rajasthan river parliament is an exceptional example of voluntary cooperation that spans 500 villages. Smaller examples of such cooperation can be found at a number of places in South Asia. We do not think that such heroic arrangements are durable or that they could be replicated widely. Yet, it is important to recognize and even develop such social capital that may contest issues and then cooperate with government in better water management. The alternative to water rights and rules established after contest is not “no conflict”, but hidden conflict.

6.7. Give safe drinking water top priority

More than a hundred million people in South Asia – all poor and the majority of them women and girls - lack access to safe drinking water. Several hundred million lack access to sanitation. As a result, millions suffer illness and premature death from water borne diseases each year. All four countries face formidable financing challenges in raising resources for meeting the Millennium Development Goal (MDG) for safe water and none appear to be on target so far.

Meeting the MDG and WSSD goals for access to safe water and sanitation will require accurate assessments of regional and local situations of water and of the poor; sound strategies for preventive and promotional hygiene education; enhanced capacities for extension of appropriate technologies; and engagement of the private sector in hardware provision at affordable prices. Above all, meeting the goals requires vision, political will and national, provincial, corporate and community leadership.

In Bangladesh, in recognition of arsenic as a major threat in the water sector, urgent rethinking is essential for the supply of safe domestic water throughout the country. While waiting for detailed analytical studies, options should be explored for alternate or mitigating actions like cheaper arsenic removal kits, boiling surface water from ponds, rainwater harvesting or extracting groundwater from deeper aquifers. A long-term sustainable strategy for conjunctive use of surface water and groundwater will have to be worked out.

PART II: CASE STUDIES

A. INTER-PROVINCIAL WATER CONFLICTS IN PAKISTAN

Only 3% of the water in the country is used in industry, so the sharing problems are predominantly within the agricultural or environmental domains. Of the four Provinces in Pakistan, the water conflicts are particularly salient between the Indus upstream province of Punjab and the downstream Sindh. Before discussing the conflicts between those two provinces more extensively, we shall describe the situation of the other two provinces.

The Northwest Frontier Province (NWFP) is located at the headwaters of the Indus and its right bank tributaries, thus ensuring that water sharing is not as urgent an issue for NWFP as for the other provinces.

Balochistan is currently not able to fully utilize its allocated share of water (allocation 3.87 MAF, of which 0.821 MAF is unutilized) until it expands its current crop cultivation by the development of the Pat and Kirthar Feeder command area and beyond. Amid accusations in the Press that Sindh is stealing water from Balochistan, the Balochistan government had approached the Sindh government for payment of Rs. 7 billion as compensation for utilizing its share of water by the latter, which it could not use for want of carrying capacity.

Various options are being considered to permit absorption of the current allocation, including taking off a Kachhi canal from the Indus river to use floodwater during the season. The province's share in flood season water is 12 % (equivalent to 2.5 MAF). It would irrigate another 0.151 million acres of land.

An extensive review of the conflict between Sindh and Punjab helps to demonstrate a number of features of conflict that may have more universal applicability. Interviews and newspaper articles during the recent drought crisis have been put together to present the “Sindhi viewpoint”.

The Viewpoint of Sindh ¹

In 1901-03 the Indian Irrigation Commission sought to discover a method by which irrigation schemes in the subcontinent could be completed without detriment to either upper or lower riparians (Kazi, 2000). Unfortunately, it did not really succeed in finding such a method, nor, at least in the perception of the Sindh, has anyone else since then. Underlying this attitude is a pervasive and mutually reinforcing lack of trust between Sindh and Punjab over their use of the water of the Indus. The Sindh sees itself as the risk-bearing party: in times of drought, it gets too little water from upstream, while in times of flood it gets too much.

Right of assent (veto)

In principle, Sindh has a strong position, as the policy established by the 1901-03 Commission gives it the power of consent over upstream diversions from the Indus. This policy was reaffirmed by the Government of India Act of 1919, which required that all irrigation projects concerning more than one province be referred to the Governor General for his decision based on the provisions of the commission report. Since then, Sindh has repeatedly lodged strong objections to any diversion of water from the Indus or to changes in the river regime through installations such as storage projects that might lead to increased withdrawal of water for the Punjab at the cost of availability downstream. Despite its nominal rights, however, Sindh has never gotten what it sees as due consideration in water related matters, while Punjab has acquired the reputation of being the “Fair-haired boy” of successive administrations over the past century or more, from British India to post-British Pakistan.

Under the British administration, a number of massive irrigation works were constructed in the Punjab without regard to the consequent harm to user rights of downstream Indus riparians. These works included the Sutlej Valley Project comprising of four barrages, the Upper and Lower Bari Doab Canal, and the Triple Valley canal project. In contrast, only one major irrigation project, the Sukkur barrage, was completed in Sindh.

¹ *This section relies heavily on Abrar H. A. Kazi (2000).*

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Politicization

Sindh sees this discriminatory attitude in water development schemes as continuing to the present day. On 30 August 2000, they received support for their position for the first time from the highest levels, as the Chief Executive, General Pervez Musharraf, said in a public address that Sindh had suffered injustice in the availability of irrigation water. Until then, complaints by Sindh over water shortages had tended to be dismissed as unfounded posturing by nationalist Sindhi leaders.

Historical use

It has been argued that the water storage network after creation of Pakistan benefited Sindh far more than any other province, and an impression is being created that Sindh was devoid of irrigation improvements until the construction of the first controlled irrigation system (Sukkur Barrage) in the province in 1932. The fact, however, is that as early as 1851, Sindh had a firm canal department. It began restoring the Begari Canal above Sukkur in 1852-53 and the Fuleli canal below Hyderabad in 1856 (Kazi, 2000). The eastern Nara Canal was improved and a cut made through Rohri Bridge in 1863. Thus, the framework for the irrigation system in Sindh now under command of the Gudu, Sukkur and Kotri barrages already existed, primarily on an inundation basis. By 1900, Sindh possessed no less than 7441 miles of canals, commanding 9.5 million acres, and was actually irrigating some 2.5 to 2.7 million acres per year. At that time the Punjab was irrigating over 4.6 million acres from perennial canals, plus another million on an inundation basis.

When the British administration began extensive irrigation development work in Punjab, without taking into consideration the recommendations of the Indian Irrigation Commission, apprehensions developed among Sindh's farmers regarding shortage of water in its inundation canal system. In order to riposte this irrigation development work in Punjab, Dr, Summers, Superintending Engineer in Sindh, obtained permission to make an extensive survey for a canal from Rohri in 1904. His investigations revealed in 1906 that three weirs were needed across the Indus at Mithan Kot (site of present Gudu

Barrage), Sukkur and Kotri, to save the economy of this tract. The Sukkur site was to get first priority.

Expert judgment vs popular opinion

Dr. Summers submitted his Rohri canal proposal in 1910. A barrage across the Indus upstream of Sukkur, with the Rohri canal on the left and one canal at the right bank, were proposed to serve a gross command area of 6.2 million acres. Later, to reduce the expense, Dr. Summers modified his proposal to include a barrage and the Rohri canal only. A high-powered technical committee, which examined the scheme in London, expressed the view that the project would not be productive, as there would be no marked effect on the inundation canals due to higher withdrawal in the Punjab area.

A sense of deprivation developed among the people of Sindh and a loud clamor for regular supplies began in the province. The Bombay government reacted to the growing public unrest, and the Sukkur barrage project was resubmitted to the Secretary of State for India in London in December 1920, and received its preliminary approval from him in June 1921 and its final sanction in April 1923. Thus a long struggle by the people of Sindh to obtain a perennial irrigation system was finally rewarded by authorization of the largest scheme yet undertaken in India, or for that matter, anywhere in the world.

It is worthwhile to note the remarks of Sir Thomas Ward, the then Inspector- General of Irrigation, India, regarding the Sukkur barrage project in 1920: “It is logical to assume that the abstraction of water from tributaries of the Indus must necessarily diminish the volume passing through Sukkur and it will obviously be necessary once construction commences on the Sukkur barrage scheme, for any future projects put forward by the Punjab to be very carefully examined in relation to the possible effect for further withdrawals from the tributaries of Indus upon the rights to irrigation from Sukkur barrage canals in Sindh”.

Upon learning of the Secretary of State’s sanction of the Sukkur barrage project in April 1923, the Government of Punjab entered its protest regarding the restriction of further withdrawals from both the Indus and the upstream tributaries. The Bombay government

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strongly objected to this attitude of the Punjab government, and complained that they had not been consulted when the Sutlej Valley Project was under consideration, and feared that the supplies available at Sukkur would be considerably less than those on which the Sukkur barrage project had been framed.

Conflict over seasonal allocations

With the construction of the Sukkur barrage in January 1932, the conflict over the waters of the Indus River between Sindh and Punjab become explicit rather than implicit. It had been assumed that once the perennial barrage controlled irrigation was introduced into Punjab and Sindh, the only problem in the Indus basin would involve the allocation of water supplies for the Rabi crops. A consideration of the agricultural cycle shows that it was not quite so simple.

The traditional division of agricultural and irrigation year into the *Kharif* period (1st April to 30th September) and the *Rabi* period (1st October to 31st March) has to be disaggregated into a division among the Kharif sowing period (April through August), the *Kharif* maturing and Rabi sowing period (September to mid December) and the *Rabi* maturing period (Mid December through March). The critical irrigation phases overlap the second and third period and the third and first periods. This analysis, though complicated, is necessary in order to explain why the critical phases in the irrigation of the Indus basin do not fall into the *Rabi* season as one might anticipate.

Coordination costs of centralized allocation

By the year 1935, the Indus basin irrigation system had become so completely integrated that no fewer than six parties had to be consulted before any new withdrawals could be authorized anywhere (Mitchell, 1967). After the creation of Pakistan, of course, the number of parties was lower, but the irrigation water distribution system became even more complex. The Indus flows through more than one administrative unit, but there is no statutory law on water rights. Instead, so called equitable water distribution in shape of the debatable Indus water appointment accord has been enforced by the central

government. It has done so under its executive powers to impose its decisions on all provinces.

The most vulnerable areas in Sindh

Sindh has argued that it requires adequate water beyond irrigation purposes to maintain its estuarial mangroves, and to preserve the vitality of the silt-dependent Katcho region.

The Viewpoint of Punjab

Historical allocation and according to Accord

Punjab argues that the stance of Sindh amounts to opening a Pandora’s box of water disputes. First, by not providing the water to link canals, Bahawalpur, Bahawalnagar and Rahim Yar Khan districts will go dry and consequently barren. Non-operation of the Chashma-Jhelum (C-J) link canal and its closure is a principal demand by Sindh to meet Sindh water shortages, and in fact to condone excessive and wasteful use of river waters by Sindh. It may be recalled that the Tarbela Dam, along with C-J and T-P link canals, were constructed under the Indus Water Treaty. Second, by not conserving the part of summer water in Mangla and Tarbela, the system will have much worse shortages for winter crops (Rabi). For instance, the Sindh experts contested the need to store 13-14 Maf water during the summer of 2000.

During the winter of 2001-02, there was a 40% shortage of water for Rabi crops. What would have happened had this water not been stored is anybody’s guess. Moreover, water stored in the two reservoirs is distributed among the provinces. As far as allocations, mentioned by the reformers, are concerned they were made on the condition that new reservoirs are distributed among the provinces and would create additional water by preserving excessive supplies in summer and preventing them from flowing into the sea. In fact, any interpretation of the Accord to provide relief in shortage periods to one province by aggravating shortages in another province, or to assign equal priority, would be against the spirit of the agreement and would destroy it (Fatehullah Khan, 2000).

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In 1991, Punjab made sacrifices in taking far less than its due share in additional supplies to facilitate the Accord. Without new reservoirs, the Accord would have hardly any value and use. The status-quo option is an indication of stagnation and looming famine condition, because the capacity of the existing reservoirs is declining due to silting. The construction of new river storage for conserving about 38 maf of the surplus flood supplies was the cornerstone of the Accord.

The objective of the Accord was to generate additional irrigation supplies to offset the loss of capacity of the existing dams, Tarbela, Mangla and Chashma, for cheap hydropower development and for major agricultural development. Sindhi farmers are receiving almost double the canal water when compared to Punjab farmers:

- For every cropped acre, Sindh received 3.8 ft of canal water against 2.18 ft for Punjab;
- Canals in Sindh have water allowances (a measure to gauge irrigation water) vastly larger than Punjab Canal, leading to large wastage and heavy water-logging. Punjab has more than double the cropped area when compared to Sindh, while the supplies through the canals are only marginally higher (up to 20%). Punjab produces 75% of Pakistan's wheat, 75% of its cotton, and 45% of the rice while Sindh produces 15% of wheat, 20% of cotton and 45% of rice;
- Punjab has a far higher productivity per unit of canal water. Sindhi experts usually refer to the availability of ground water that could be a substitute of canal water to Punjab farmers. However, groundwater is not an independent source of irrigation supply. It is generated from the loss of seepage water through unlined canal systems. River water at canal head, the source of the groundwater, is already allocated to each province as a part of its overall share;
- During the formulation of the Indus water treaty, the World Bank decided not to consider tube wells for meeting shortages, but to construct storages at Mangla and Tarbela. Various commissions and committees on provincial water disputes did not consider ground water as a source while apportioning river water;
- The Punjab farmers picked up the canal seepage losses in the form of groundwater at a very high cost of Rs.1000 to Rs.1200 per acre-feet. Further, the good ground water has 3 to 4 times as much dissolved salt as river water. Punjab has nearly exhausted its groundwater potential for further private tube-wells. Sindh has vast potential to substantially increase its irrigation supply by the lining of the channels.

Actually, the 1991 Accord was a document for prosperity sharing and for determining the future shares of all riparians in the developed supplies. The Accord has envisaged a total availability of 114 million acres feet (Maf) of irrigation water against the actual availability of 104 Maf on the premise that the surplus water in summer will be conserved in new reservoirs. But this objective could not be achieved due to the stiff opposition from Sindh to the construction of any reservoirs. The two provinces - Punjab and Sindh- the main users of irrigation water, are quarrelling on the existing water supplies by interpreting the Accord according to their own interests.

Sindh is asking for its share as written in the 1991 Accord. The Punjab, however, insists that this allocated share was subject to the condition that Sindh would agree to the construction of new water reservoirs. As Sindh did not allow the building of any reservoir, water ought to be apportioned as it used to be before the Accord. Punjab's expert told “The News” in Lahore that in the 1991 Accord the existing uses of all the provinces at that time were fully protected (Kabir, 2000). This baseline was taken as the average of actual five years post -Tarbela 1977-88 uses of the irrigation water by all the provinces, and it was to form the basis of equitably sharing shortages between the provinces. While signing the Accord, the provinces have accepted, under the accepted distribution principles, the priority of existing uses and the Indus Water Treaty of 1960. However, in a recently circulated paper titled, ‘Kharif 2000 River Water Distribution and Management some leading Sindhi experts, called 'the Reformers', have taken the position that in the shortage year no water should be given to the two Indus link canals, which irrigate southern Punjab. They have asked not to fill Tarbela and Mangla reservoirs during the summer (Kharif) in case of water shortages.

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B. INTER-STATE CONFLICTS IN INDIA

The framers of the Indian constitution have drawn up very specific laws and provisions governing the development and management of the country's water resources. During the last five decades, since the Constitution of India was enacted (1950) in the Parliament, the changes necessitated in these laws and provisions, under the quasi-federal system of governance (Union of States), have been complex. A National Water Policy was defined only in the year 1987 (GOI, 1997b), forty years after India attained independence, and many of the policies contained therein still need to be implemented.

Since the adoption of National Water Policy 1987, many developments in the water sector at the national level have necessitated its revision. A revised National Water Policy 2002 was approved by the National Water Resources Council (NWRC) on April 1, 2002.

Basically, “water” is a State subject, with the Union's role limited to the Inter-state Rivers. The constitutional provisions related to water are contained in the Seventh Schedule - Article 246 (MOL&J, 1996), as discussed under the Union List, State List, and Concurrent List, which are defined below:

“List I - Union List” (Entry 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 declared by law to be expedient in the public interest".

“List II - State List” (Entry 17)

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

"List III - Concurrent List" (Entry 20)

There is no entry on water, but there is an entry on planning, under “Economic and Social Planning”. Since water is a significant input in agricultural development and industrial development, which are indicators of economic development, and since water is a primary need (drinking and sanitation) for social planning, water resource development could be covered under Concurrent List also. Only Entry 17 of List II has been in operation all along. However, Entry 20 of List III (Concurrent List) could also be said to have operated indirectly, in view of the fact that the Central Government, through the Planning Commission,

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has to clear Water Resources Development projects for investments, if these projects are to be eligible for central funds.

“Article 246”

“Subject – matter of laws made by Parliament and by Legislatures of States”

“(1). Notwithstanding anything in clauses (2) and (3), Parliament has exclusive power to make laws with respect to any of the matters enumerated in List I in the Seventh Schedule (in the Constitution referred to as the “Union List”)”.

“(2). Notwithstanding anything in clause (3), Parliament, and subject to clause (1), the Legislature of any State also, have power to make laws with respect to any of the matters enumerated in List III in the Seventh Schedule (in the Constitution referred to as the “Government List”)”.

“(3). Subject to clause (1) and (2), the Legislature of any State has exclusive power to make laws for such State or part thereof with respect to any of the matters enumerated in List II in the Seventh Schedule (in the Constitution referred to as “State List”)”.

“(4) Parliament has power to make laws with respect to any matter for any part of the territory in India not included (in a State) notwithstanding that such matter is a matter enumerated in the State List”.

In accordance with the existing constitutional provisions relating to ‘water’, the primary responsibility for development rests with the State Governments. However, if water is transferred from List II to List III - Concurrent List, as per Article 246 (2), Parliament as well as the legislature will have the power to make laws with respect to water.

Entry 56 of List I does not deprive the States of any power to which they are entitled under Entry 17 of List II; List I stipulates in respect of “Regulation and Development of Inter-State rivers and river valleys”.

“Disputes relating to Water: Article 262”

“Adjudication of disputes relating to waters of Inter-State Rivers or river valleys--

(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)”.

Most of the rivers in India are inter-state. The regulation and development of waters of these rivers is a source of inter-state differences and disputes leading to inordinate delays in implementation of projects. Even so, "Entry 56 of List I (Union List)" has never been invoked under Article 246 of the Constitution, which deals with the subject matter of

laws to be made by the Parliament and by the States Legislatures. On the contrary Article 262 of the constitution has been used to resolve inter-state river water disputes.

The political perceptions may not help in enacting legislation under Entry 56. With different parties in power at center and in states, with regional parties in the states demanding more autonomy and used to Article 262 having been used, though sparingly, strong opposition may be expected to any attempt at significant changes in the constitution, even resented from the states. Major amendments in the constitutional provisions may be even more difficult.

The Inter State Water Disputes Act, 1956 (ISWD) has been enacted by Parliament in exercise of the power conferred by this article (GOI, 1956a). The subject matter of the act is not covered by any of the Entries in the Legislative Lists. Moreover, the power conferred by this article overrides the legislative Entries. Under this Act, five Tribunals i.e., Krishna Water Dispute Tribunal, Godavari Water Dispute Tribunal, Narmada Water Dispute Tribunal, Ravi Beas Water Dispute Tribunal, and Cauvery Water Dispute Tribunal have been set up.

“Article 253 - Legislation for giving Effect to International Agreement”

“Notwithstanding anything in the foregoing provisions of this chapter, Parliament has power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or any decision made at any international conference, association or other body”.

Entry 10 of the Union List I under Seventh schedule confers on the Union Parliament right on “Foreign affairs; all matters which bring the Union into relation with any foreign country” and Entry 14 empowers the Union to “Enter into treaties and agreements with foreign countries for implementation of treaties, agreements, and conventions with foreign countries”.

Article 253 makes it clear that the power to enter into treaties conferred on Parliament, carries with it, as incidental treaties, a power to override the State list, to enable the Union to implement the treaty. Thus, a law passed by the Parliament to ratify an international convention shall not be invalidated on the ground that it contained provisions relating to the State subjects. The effect of Article 253 is that if a treaty, agreement or convention with a foreign State deals with a subject within the competence

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of the State legislature, Parliament alone has, notwithstanding Article 246(3), the power to make laws to implement the treaty, agreement or convention or any decision made at any international conference, association or other body. The article deals with legislative power; thereby power is conferred upon Parliament, which it may not possess otherwise.

Under the powers conferred under the above, the Union of India signed the Indus Water Treaty with Pakistan in the year 1960. In conformity with the Treaty provisions, further Inter-state Agreements have been signed from time to time (CWC, 1995 & 1997). Under the same Article, the Treaty with Nepal on the Integrated Development of the Mahakali, 1996 and the Treaty on Ganga Water Sharing at Farakka, 1996 with Bangladesh, have been signed.

The Central Govt. has enacted a number of Acts & Laws on Inter-state Water Resources, and also enunciated a National Water Policy. These are discussed in the following sections.

The River Board Act 1956

This Act, which came into effect on 12 September 1956 (GOI, 1956b), provides for the establishment of River Boards for the Regulation and Development of Inter-state rivers and river valleys.

The Central Government has not constituted any River Board under this Act. The role of the River Boards, as envisaged in the Act, is only advisory in nature. The Government of India, however, constituted the Betwa River Board, Bansagar Control Board, Tungabhadra Board, Brahmaputra Board, and Yamuna Board, outside the River Board Act 1956, for specific purposes. The National Commission has recommended (GOI, NICWRDP, 1999) enacting a new Act called "Integrated and Participatory Management Act" in place of the existing River Board Act, 1956.

Inter-state Water Disputes Act, 1956, as modified/ amended up to 1986

This Act is to provide for the adjudication of disputes relating to waters of Inter-state Rivers and River Valleys. The Act came into effect on 28 August 1956, has been

modified from time to time, and was last amended on 18 March 1986 with the insertion of a new provision, Section 14, to achieve the objectives set forth.

The Act empowers the Central Government to set up, on a complaint from a State Government that a water dispute with the Government of another in relation to the water of an Inter-state river or river valley has arisen or is likely to arise, a tribunal for adjudication of the dispute. The Tribunal shall consist of a chairman and two other members nominated in this behalf by Chief Justice of India from among persons who at the time of such nomination are judges of the Supreme Court or of a High Court (Section 4 (2)).

After constitution of the Tribunal under Section 4, the Central Government shall, under Section 5 of the Act, refer the dispute and any other matter appearing to be connected with, or relevant to, the water dispute to the Tribunal for adjudication, subject to the provisions contained in section 8.

The decision of the Tribunal shall be published in the official gazette and the decision shall be final and binding on the Parties to the dispute and shall be given effect to by them (Section 5). Under Section 6, no reference shall be made to a Tribunal of any dispute that may arise regarding any matter which may be referred to arbitration under the River Board Act - 1956. Under Section 11, neither the Supreme Court nor any other court shall have or exercise jurisdiction in respect of any water dispute, which may be referred to a Tribunal under this Act.

The above Act was used to set up several Tribunals to settle the Inter-state Water disputes. This Act was revised in 2001, taking due consideration of the recommendations of the Sarkaria Commission on Center-State relations.

Standing Committee on Inter-State Issues in Water Resources

This Committee was set up by the Ministry of Water Resources in April 1990 to assist the National Water Resources Council (NWRC). With a view to resolving Inter-state differences, it renders advice on modifications to specific elements of Water Plans and on such other issues that may arise during the planning or implementation of projects. The Committee comprises the Union Minister of Water Resources as the chairman, and the Union Ministers of Agriculture, Energy, Urban Development, Environment and Forests,

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and Science & Technology as its members. The Secretary (Water Resources) serves as Member-Secretary. The Chief Ministers of the concerned States are special invitees to the meetings of the Committee. The recommendations of the Committee are advisory in nature, and are without prejudice to the provisions of the Inter-state Water Disputes Act.

Sarkaria Commission on Centre- State Relations

This Commission, while examining matters of Inter-state relationships, also examined the constitutional provisions related to water in respect of Inter-state water disputes. The Commission was of the opinion that there is need for Union control over waters of Inter-State rivers and river valleys. In matters of local concern, however, as in the case of 'land', States should have powers in respect of waters which are not part of inter-state rivers, and are located in the State and are located within the territory of each State. The Commission was of the view that the existing arrangements in the Constitution are the best possible method of distributing powers between the Union and the States with respect to a highly difficult and sensitive subject. The Commission also ruled out the entry of the subject in the 'Concurrent List'.

The Sarkaria Commission had also examined the provisions of the Inter-State Water Dispute Act of 1956. It gave several recommendations for amending the Act, out of which the Inter-State council and its Standing Committee, after examination endorsed the following (GOI, NICWRDP, 1999):

- Once an application under Section 3 of the Inter-State River Water Disputes Act (33 of 1956) is received from a State, it should be mandatory on the Union Government to constitute a Tribunal within a period not exceeding one year from the date of receipt of any disputant State; modified by the Council to the extent that "the disputes already settled may not be reopened".
- There should be a Data Bank and Information System at the national level and adequate machinery should be set up for this purpose at the earliest. There should be a provision in the Inter-State Water Disputes Act, that States shall be required to give necessary data for which purpose, the Tribunal may be vested with the powers of a Court.
- The Tribunal should give its award within a period of three years from the date of its constitution. However, if for unavoidable reasons the award could

not be given within the specified period of three years, the Union Government may extend the period suitably not exceeding two years. The award should be implemented two years from the date of notification of the award. If for unavoidable reasons the award could not be implemented within period of two years the Union Government may extend the period suitably.

- The Inter-State Water Disputes Act, 1956 should be amended so that a Tribunal’s award has the same force and sanction behind it as an order or decree of the Supreme Court to make a Tribunal’s award really binding.

The Commission's recommendations have been worked on. Other Commissions and Committees have from time to time given similar recommendations and also suggested action on Sarkaria Commission's recommendations. The Inter-State Water Dispute Act, 1956 was amended in 2001.

Indus Basin

The Indus basin extends over an area of 11,65,500 sq. km. and lies in Tibet (China), India, Pakistan and Afghanistan. According to the Indus Water Treaty of 1960, India has exclusive rights to the uses of the three Eastern rivers (the Sutlej, the Beas and the Ravi) and Pakistan has full rights on the uses of the three Western rivers (the Indus, the Jhelum, & the Chenab). The drainage area is nearly 9.8% of the total geographical area of the country. The basin lies in the States of Jammu and Kashmir, Himachal Pradesh, Haryana, and Punjab.

Eastern Rivers

The high level of development in the basin is reflected by the fact that out of an ultimate irrigation potential of 5.3 million hectares (m. ha), 4.5 m. ha have already been developed; the present stage of utilization of surface water is 87% and of ground water is 80.5%. The live storage capacity created is 14 billion cubic metres (BCM). The Bhakra–Beas system in the basin is a major multi-purpose system catering to competing demands, and forms a major part of the overall plan for optimum utilization of waters of the three rivers. In the hydroelectric power generation sector, a total installed capacity of 3,517 MW from 190 projects are in operation, out of an assessed total potential of about 20,000

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MW at 60% load factor. 14 projects with a potential of 3,517 MW (CWC, 1989) are under construction.

The Bhakra-Beas system, a major multipurpose development in the basin, with the Bhakra dam (highest dam in India) forming a part of the system and the gigantic Indira Gandhi Canal Project, which has changed the complexion of the arid region of the Northwestern part of Rajasthan, are monumental achievements. Thus, a fairly good integrated basin management is taking place in this basin. The Bhakra-Beas Management Board (BBMB), was set up under the Punjab Reorganization Act 1966, as an institutional mechanism to monitor and implement sharing of the Ravi-Beas waters as per inter-state agreements.

Ravi-Beas Tribunal

With the Reorganization of the Punjab into the two separate States of Punjab and Haryana in November 1966, the distribution of the share of the water in the Indus System's Eastern Rivers became, inter alia, a major issue of contention. Notwithstanding the special provisions made with respect to the rights and liabilities of successor States in relation to the Bhakra-Nangal Project and Beas Project, claims and counter - claims were raised by both Punjab and Haryana. A lasting and satisfactory solution could not be reached even after 20 years of negotiations.

Finally, an Accord, called the "Punjab Settlement", was signed between the Prime Minister of India and a leader of the Punjab in July 1985 (GOI, 1987a), which also dealt with the question of sharing of the Ravi-Beas waters. The Punjab Settlement of 24-7-1985 provided for the following on sharing of river waters under paragraph 9 of the Accord:

9.1. The farmers of Punjab, Haryana and Rajasthan will continue to get water not less than what they are using from the Ravi-Beas system as on 1.7.1985. Waters used for consumptive purposes will remain unaffected. Quantum of usage claimed shall be verified by the Tribunal referred to in para 9.2 below;

9.2 The claim of Punjab and Haryana regarding the shares in their remaining waters will be referred for adjudication to a Tribunal to be presided over by a Supreme Court Judge. The decision of this Tribunal will be rendered within six months and would be binding on

both parties. All legal and Constitutional steps required in this respect be taken expeditiously;

9.3 The construction of SYL Canal shall continue. The canal shall be completed by 15th August 1986”

This settlement led to the setting up of a tribunal in April 1986 to adjudicate the claims of the States regarding their share of the Ravi-Beas waters. The Tribunal was presided over by a Supreme Court Judge, and the decision of the Tribunal would be binding on all parties. Haryana, Punjab and Rajasthan, the Party States to the Tribunal, put forth claims and counter - claims.

The Tribunal, after hearing the arguments of all the parties to the dispute, gave its report in January 1987 (GOI, 1987a). The Central Government made a *suo moto* reference to the Tribunal in August 1987 seeking explanations and guidance, in accordance with the provisions under Section 5(3) of the Inter-State Disputes Act, 1956. The Central Government also forwarded similar references received from the States of Rajasthan, Haryana and Punjab to the Tribunal. The Tribunal started hearing the references in September 1987, but since then the hearings have only been held in fits and starts. The Final Award of the Tribunal, which was to be originally given within six months of constituting the Tribunal, is yet to see the light of day. The Ravi-Beas water sharing conflict remains. The reasons are not far to seek --- they are simply electoral politics. For the people, the issue is emotional, based on perceived injustice as articulated by the political parties.

Western Rivers

In the area covered by the three western rivers of Indus, Chenab and Jhelum, on which India has only very limited consumptive use rights but full rights for non consumptive uses, development has not been as extensive as along the Eastern rivers of Ravi, Beas and Sutlej. Development activities within India are governed by the Treaty provisions, which are monitored by the Permanent Indus Commission. The Tulbul Barrage project on the

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Jhelum for navigation purposes for the welfare of the people of Jammu and Kashmir was started in 1984 but has been stalled since Pakistan raised objections, in the Indus Commission, on water sharing under the Indus Water Treaty (GOI & GoP, 1960). The conflict is yet to be resolved.

Ganga Basin – Inter-state Conflicts

Within India, it should be noted that the river waters of the Ganga basin as a whole have not been allocated to the basin States of Uttaranchal, Himachal Pradesh, Haryana, Rajasthan, Delhi, Uttar Pradesh, Bihar, Jharkhand, & West Bengal, except for specific sub - basin or project - specific Agreements among or between the States. The major sub - basins of the Ganga on the right bank above the delta bifurcation are the Yamuna, including the Chambal River - its most important tributary, the Tons, the Karamnasa, and the Son. The Right Bank of the Ganga below its confluence with the Son is drained by a number of small rivers.

The important left bank tributaries of the Ganga above the delta bifurcation are the Ramganga, the Gomati, the Ghaghra, the Sarda (Mahakali in Nepal on which a treaty on water sharing has been signed) a major right bank tributary of the Ghaghra, the Gandak, the Buri Gandak and the Kosi (formed by three major tributaries of Sun Kosi, Arun and Tamur). The Mahananda, a left bank tributary, which rises and flows in India for 65 % of its catchment, joins the Ganges/Padma tributary in Bangladesh. Bhagirathi, the right bank tributary of the Ganga in its last stretches in India, receives drainage from the Dwarka, Ajay, Damodar, Rupnarain, and Haldi rivers, before it joins the sea through the Hooghly estuary.

The Ganga and its left bank tributaries - Yamuna, Ghaghra, Gandak and Kosi - have their origins in the glaciers in the Great Himalayas, and therefore have a significant snow melt contribution which sustains the river flow during the lean season. The sub - basin Agreements and the conflicts in water sharing are discussed in greater detail below.

Yamuna Sub basin

The River Yamuna, rising in the Great Himalayas of Uttar Pradesh (now Uttaranchal State), has a catchment area of 366,220 sq. km, all of which is within India. The utilization of its waters started in 1882 under the British Raj (CWC, 1989). The reach of the river from its origin up to Delhi is called the Upper Yamuna River, involving the States of Himachal Pradesh, Haryana, Delhi, Uttaranchal and Rajasthan. The most recent agreement is the Upper Yamuna Agreement of May 1994. This Agreement (CWC, 1995 & 1997) has a significant bearing on the evolution of the Water Plans of the States, since it takes note of the maximisation of use of the surface flow of the river through a number of identified storage projects on the river, upstream of Tajewala.

The mechanism of the Upper Yamuna Board has been established for allocating available flows among co-basin States, within the overall framework of the Memorandum of Understanding (MoU). The MOU provides for building of upstream storages to enhance the utilization of the surplus flow of the river Yamuna. The Upper Yamuna Board is periodically meeting to monitor the implementation of the MOU and resolve any conflicts.”

An interesting feature of these negotiations was that the total demand of the basin States was over three times the available flow in the river. These demands were based purely on political grounds. Another interesting aspect of the conflict deals with the established irrigation needs of Uttar Pradesh (U.P) and Haryana, and the projected Municipal and Industrial (M&I) needs of Delhi and Rajasthan. Notwithstanding the agreement, the conflict is far from over. The Courts had to intervene often to ensure that Delhi gets its share to meet M&I needs. U.P. and Haryana could otherwise withdraw all the water upstream of Delhi for irrigation.

The Chambal River, an important tributary of the Yamuna with a catchment area of 140,000 sq km, is almost fully utilized for irrigation and power development in the States of Madhya Pradesh and Rajasthan through a cascade of three storage dams. The entire development has taken place by mutual consent between the two States without a formal

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agreement. The Chambal Control Board, an Inter-state body with Rajasthan, Madhya Pradesh and the Central Government constituting the Board, resolves Inter-state issues on an ad-hoc basis. Although Uttar Pradesh is a riparian of the Yamuna, it has not staked claims for the Chambal Waters under a tacit informal understanding with the Central Government.

The Sone Sub Basin

The Sone River is a south bank tributary of the Ganga, with a catchment area of 71,260 sq. km covering the States of Madhya Pradesh, Uttar Pradesh, and Bihar. The utilization plans for the waters of this river have been formulated, and specific agreements reached among the co-sharing States for sharing of the waters as also the benefits from identified projects (CWC, 1989 & Char, 2000). The Bansagar Board, comprising the States of Bihar, Madhya Pradesh (MP) and Uttar Pradesh (UP) and the Central Government, controls the construction and operation of the Bansagar dam project on the Son, under an agreement signed by them. However, the Rihand dam constructed on the Rihand river, a tributary of the Sone, has been built by the Uttar Pradesh Government.

Bihar, which has a large irrigation system in its territory developed since 1874 through a weir, since replaced by a barrage, to command an area of 350,000 ha for irrigation, did not contribute to the cost of construction of Rihand dam. They also did not object to the project. The Rihand dam has only a power generation component and it can enhance the lean season flow in the river to the advantage of Bihar.

Bihar may have assumed that the water will be released through the power station to meet their requirements. However, the hydropower Plant at Rihand is operated to meet the emergency requirements of the large U.P. power grid. The operation hardly ever synchronizes with Bihar's needs – creating a conflict that frequently requires the intervention of the Central Government.

Another issue is the assessment made by the Sone River Commission of the 75% availability of the basin yield. The State of Bihar has neither accepted this assessment nor

given any alternate figure with justification to substantiate their objections. Other party States have accepted the Commission's assessment.

Damodar Sub Basin

Damodar is the first basin in India where Integrated River Basin development was started, patterned on the lines of the Tennessee Valley Authority (TVA) in the USA. The development envisaged the building of seven reservoirs on the Damodar and its tributary rivers, with the joint participation of the basin States of then Bihar (now Jharkhand), West Bengal, and the Central Government. The objectives of this integrated development were the construction and operation of irrigation facilities, water supply, drainage, flood control, thermal and hydro-electric generation, navigation, afforestation, control of soil erosion, public health, and the agricultural, industrial, and economic development of the valley (Char, 2000).

The implementation of the Plan was initiated in 1948, when India was still a Dominion. Full implementation of the original Plan could not be undertaken, since the basin states had full rights after 1950, when the Indian Constitution was enacted and water became a State subject. Even partially implemented, the scheme has been extremely beneficial to the States in irrigation, power development, and flood control.

The Projects were implemented through the Damodar Valley Corporation (DVC), which was specially set up under an Act of the Parliament as a semi - autonomous organization. DVC has been faced with multiple conflicts. It would like to operate the Dams for optimization of power benefits, whereas West Bengal wants the water for irrigation. Irrigation and power demands do not coincide. The important benefit of flood moderation cannot be realized fully, because Jharkhand does not allow full flood storages in the reservoirs, as the submergence effect is in that State.

The upstream riparian State of Jharkhand has to acquire land for reservoir submergence, which is a difficult task now. Also, some coal mining areas would be submerged at higher elevations, which is not a feasible proposition. Since the benefits to the upstream

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State are minimal, there is hardly any progress on the overall scheme of seven dams (five are already in operation, even though some of them are partially impounded due to submergence problems), and even the existing dams are not able to fully provide the planned benefits. It will be difficult to reconcile the conflicting interests of the basin states and to develop the basin as envisaged originally.

Upper Ganga Sub Basin including Ramganga Sub Basin

The basin lies in the northwestern part of Uttar Pradesh, now a new State called Uttaranchal, and has a catchment area of 32,490 sq. km. The sub - basin lies entirely within India. Development projects through river diversion schemes, with canal systems on the main stem of the Ganga and its tributary Ramganga, were started during the 1840s and 1880s. Three storage projects are under construction or planned on the main Ganga, of which the most controversial is the Tehri dam project due to submergence problems (Char, 1997). On the Ramganga, a hydroelectric project with the Ramganga dam and associated weir for downstream irrigation has been operational since 1974.

Under the newly constituted Uttaranchal State (area 55,845 sq. km), there is a provision in the Gazette notification constituting the State of Uttaranchal, to set up a Ganga Management Organization (GOI, 1999). This organization is to be under the control of the Central Government, and will have the States of Uttaranchal (the upper riparian) & Uttar Pradesh (now lower riparian after bifurcation of the State) as members. As per Section 78 of the Uttar Pradesh Reorganization Act, 2000, the rights and liabilities are to be decided by agreement by the states within two years, and if it is not entered into, the Central Government may decide within one year. The sharing of benefits and costs will be a key issue which could create conflicts, since most of the head works in this sub basin that provide extensive irrigation and power benefits to Uttar Pradesh are located in the newly formed State. Only time will show the intensity of the conflicts, unless they can be resolved before they are politicized.

Brahmaputra Basin – Inter-state conflicts

The Brahmaputra basin lies in the States of Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal. The water resources potential of the basin is the highest in the country. Their utilization for irrigation is, however, very small so far -- only about 1 BCM against the identified capacity of 60 BCM (CWC, 1989). Only a few medium and small projects have been taken up for implementation. The Hydropower potential is assessed at 31,012 MW (at 60% load factor), accounting for 37% of the country’s potential, while the developed schemes account for only 1,043 MW installed capacity. The flood and erosion problems in the valley are endemic.

The economic development in this region was almost negligible prior to India’s independence. In the post - independence period, much emphasis has been placed on finding lasting solutions for the flood problems of the valley, with due consideration given to developing multipurpose projects for hydropower and irrigation development. With this goal in view, a separate Board called the Brahmaputra Board, was set up under an Act of Parliament. Several mega projects have been investigated for power development and flood control, which could increase the low season flows in the river and also reduce flood problems in the valley by virtue of flood cushion to be provided in some of the major dams. Except for the issues of sharing of benefits from the multipurpose projects, there are no water sharing conflicts in the basin amongst the riparian States.

Barak Basin – Inter-state aspects

The Barak basin lies in the States of Meghalaya, Manipur, Mizoram, Nagaland, Assam and Tripura. The proposed Tipaimukh multipurpose project (details were provided in section 3.5) on this river has not made much progress due to the lack of agreement amongst the riparian States on the issues of reservoir submergence areas and the sharing of benefits.

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Narmada Basin

The Narmada basin States are Madhya Pradesh, Maharashtra and Gujarat. Water disputes between the basin States had retarded the progress of water resources development in the basin until a Tribunal was set up in 1969 to adjudicate the basic framework of development in the basin on the basis of the plans prepared by the basin States. The State of Rajasthan, though not a riparian State, was included as a beneficiary State on the grounds of social justice to benefit the desert and arid parts of the State, which had no other reliable source of water.

The Tribunal had the advantage of a mutually agreed settlement (1974) worked out through the good offices of the Prime Minister, among the Chief Ministers of the four States on assessment of the total available flows. All the Party States accepted the principle of equitable distribution. The Tribunal gave its Award in 1979, after 10 years of deliberations, and laid down the basic framework for water resources development in the basin (GOI, 1978), envisaging detailed directives on the Narmada Sagar Project in Madhya Pradesh and the Navagam dam (Sardar Sarovar Project - SSP), the terminal dam in Gujarat.

Twenty-nine major dams on the river and its tributaries, 135 medium reservoirs, and 3000 small size storages for utilizing the available water were also proposed. The Tribunal endorsed the mutually agreed share of water among the States and made it clear that each State has freedom to use the water allocated to it within or outside the basin, as deemed fit. The apportionment of water ordered is to be reviewed after 45 years. The height of the Navagam (Sardar Sarovar) dam, the ruling levels for FRL (455') and MWL (460') and Full Supply Level of the Canal (300') were prescribed by the Tribunal after a detailed examination of the claims put forth by the Party States.

Detailed guidelines on the Resettlement and Rehabilitation of project - affected people (called "oustees") have been set out based on a land for land package, the first such package for any project in the country. The Tribunal also stated that displaced persons in Maharashtra and Madhya Pradesh desirous of resettlement in Gujarat must be

rehabilitated there. The Tribunal held that amendments, alterations, and modifications may be effected by agreement between all the Party States. The Narmada Control Authority (NCA) was established to implement the decisions of the Tribunal. The NCA has structured two high level Sub-groups, one for Environment and the other for R&R (Resettlement and Rehabilitation).

The review mechanism of the "Review Committee of NCA" (RCNCA) is also functional. The Sardar Sarovar project, as conceived and under implementation, envisages a 163 m high dam (above deepest foundation level) with ruling levels as prescribed in the Award, with two power stations - the Canal Head power Station with an installed capacity of 250 MW and a River Bed Power House with an installed capacity of 1,200 MW (6 units of reversible turbine generators).

People affected by the Sardar Sarovar project protested strongly, with the help of a dedicated and strong NGO group. They started initially with bitter criticism of the R&R package and its implementation, and sought an improved package. They were able to put pressure on the World Bank to undertake a Mission to examine the “very basis” of the Project. The Mission's report (Morse, Independent Review Mission, 1992) and the subsequent withdrawal of the Bank from this project further heightened the opposition to the Project, and resulted in a Public Interest Litigation (PIL) being filed in the Supreme Court in April 1994. The petition sought the stoppage of construction of project work, and a comprehensive review of the project by an independent expert body. The conflict in this case is not really about water sharing but between the affected people and the States.

The PIL filed by the NGO in the Supreme Court was admitted in April 1994. Madhya Pradesh reopened the issue of the height of the dam. The case went on for over 6 years (when the construction of the main dam was stopped), a period that was very crucial for achieving the planned benefits from the project, and finally in October, 2000, the Supreme Court gave its judgment -- a majority judgment of 2 to 1.

The important aspects of the judgment are:

- i) Construction of the dam shall proceed as per the NWDT award;

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- ii) The Narmada Control Authority (NCA) will formulate an Action Plan with regard to R&R, environmental safeguard measures etc.;
- iii) The construction of the dam shall be worked out by the NCA in consultation with the Secretary (Environment and Forests) and the Secretary (Social Justice and Empowerment) as Chairman of the Environmental Sub-Group and R&R Sub-group respectively. The views of the Grievance Redressal Authorities (GRAs) of the States shall also be considered; and
- iv) The Review Committee of NCA (RCNCA) shall meet whenever any unresolved matter is referred to it by NCA, and at least once in three months, to oversee the progress of the work.

The dissenting Judge upheld the petitioners' plea and ruled that the construction should be seized immediately, that there is no environmental clearance for the project and a Committee should scrutinize the available data and recommend for environmental clearance, and presuming that the environmental clearance is given, the construction shall proceed *pari passu* with the resettlement and rehabilitation of those ousted.

The Godavari Basin

The Godavari Basin, the largest river basin in South India, lies in the States of Maharashtra, Andhra Pradesh, Madhya Pradesh, Orissa and Karnataka. Before the middle of the nineteenth century, there were tanks and small diversion schemes in the basin. The first major irrigation work, namely the Godavari Delta Canal System, was completed in 1877. Until 1950, when the new Constitution of India came into effect, few major irrigation works were undertaken in the basin.

After 1950, the pace of development increased and major irrigation and multipurpose schemes were planned by all the riparian States. This necessitated an agreement for sharing the waters of the Godavari and its tributaries, and a Memorandum of Agreement signed in 1951 allocated the flows of the river basin among the concerned States (GOI, 1979 & 1980). However, Orissa, a co-riparian interested in the sharing of the Godavari waters, was not invited to this Conference. In view of the territorial changes due to

reorganization of the States, the Central Water & Power Commission had drawn up a scheme for re-allocation of the Godavari waters, which was not accepted by the States, and a dispute ensued. In May 1961 the Krishna Godavari Commission was set up to determine the dependable flow for sharing but the Commission found that this could not be done without additional data.

Several Conferences were convened by the Central Government to settle the dispute, but the States of Maharashtra, Mysore, Orissa and Madhya Pradesh made fresh applications in 1968 for reference of the dispute to a Tribunal. Eventually, in April 1969, the Central Government constituted the Tribunal. Between the time the Tribunal was set up and the time they started hearing the dispute in January 1974, several projects were approved for construction. In December 1975, all the five riparian States of Maharashtra, Madhya Pradesh, Orissa, Karnataka and Andhra Pradesh agreed to the clearance of projects for the utilization of the waters of the River Godavari and its tributaries in accordance with certain bilateral agreements between them.

The claims before the Tribunal were for equitable distribution of dependable flows, annulment of the 1951 Agreement, submergence caused by projects, suitable provision for the sharing of excess or deficient supplies, and directions for diversion of the waters of the Godavari into the Krishna. Additional claims focused on a suitable machinery for implementing the orders of the Tribunal, the right to appropriate the Godavari waters to the extent of its contribution within their territory, ensuring timely supplies to the committed projects taken up before 1951 on a daily basis and for projects taken up between 1950 and 1960 assurances of supplies on a weekly basis.

As the adjudication proceedings of the Tribunal were in progress, the States arrived at mutually acceptable solutions on water sharing by bilateral and trilateral negotiations in 1978-79, and signed agreements with regard to a number of irrigation projects. The Tribunal took cognizance of all these Agreements.

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The Award

The Tribunal, in its Final Award of July 1980, ratified the bilateral and trilateral Agreements entered into by the five Party States and allowed the specific use of Godavari waters up to specified dam sites, with due protection of downstream uses on the main river and its tributaries in each of the Party States (GOI, 1979 & 1980). It also ruled that the States can make use of underground water within their respective State territories in the basin, and such use shall not be reckoned as use of the water of the river Godavari. The States have the liberty to divert any part of its share of waters allocated to it to any other basin. There is no conflict at present.

Krishna Basin

The Krishna has the second largest Inter-state river basin in Southern India, covering the States of Maharashtra, Karnataka, & Andhra Pradesh. The basin is agriculturally well developed, with major irrigation works undertaken since the 1850s. Prior to 1855, the irrigation works were mostly in the form of tanks and small diversion schemes. During the British rule, until the conclusion of the Second World War, the unitary control of the Government of India provided little scope for water disputes. Only minor disputes, relating to the Tungabhadra waters, were amicably settled in 1892 and 1933. With the GOI Act of 1956 giving exclusive rights of water to the Provincial Governments, agreements were reached in 1944 concerning the sharing of Tungabhadra waters, which enabled the States concerned to construct a few major projects.

With the Constitution of India coming into force from 1950, and with the subsequent reorganization of States in 1956, the basin came under the jurisdiction of the States of Maharashtra, Mysore (name was again changed to Karnataka after Mysore State Act, 1956) and Andhra Pradesh. Extensive development works in the water resources sector were undertaken. In July 1951, a Memorandum of Agreement was drawn up apportioning the available supply of the Krishna River system for a period of 25 years, but the State of Mysore refused to ratify the Agreement. The Planning Commission, however, continued to clear the projects on the assumption that this agreement was binding upon the States.

With the pace of development increasing, and the projects planned by the State Governments envisaging demands on more water than the available supplies, objections were raised concerning several major projects (GOI, 1976). Disputes arose and a request was made to set up a Tribunal. The Krishna Godavari Commission appointed by the Central Government in May 1961 found that, without further data, it was not possible to determine the dependable flow accurately. In March 1963, the Union Government held that the 1951 Agreement had become void and suggested that pending final allocation the projects should be cleared on the basis that the withdrawals of supplies by Maharashtra, Mysore and Andhra Pradesh should not exceed 400, 600, and 800 TMC respectively. This was not agreeable to the States, and Maharashtra asked for a reference of the dispute to the Tribunal.

The Central Government tried several rounds of negotiations through Inter-state conferences, but failed to resolve the dispute and finally in April 1969, the Government of India constituted the Krishna Water Disputes Tribunal for adjudication of the water dispute.

The main points of the case are:

- The 1951 Agreement is void, and the subsequent interim allocations suggested by the Union Minister of Irrigation and Power in March 1963 are not acceptable;
- The water utilization in the proposed projects and trans-basin diversion should be restricted;
- Equitable distribution of the waters is to be determined at 75 % availability;
- A suitable mechanism for the implementation of the Tribunal Award should be proposed;
- The dependable yield should be set at 1745 TMC;
- Full supplies should be ensured on a daily basis for all projects committed before 1951, and on a weekly basis for projects committed up to 1960.

The Tribunal Award

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The Tribunal Award of May 27, 1976 was announced on 31st May 1976. The important aspects of the Award are:

- The 1951 Agreement was not valid. The 75% dependable flow of the river Krishna up to Vijayawada is 2060 TMC, allocated to the three States of Maharashtra (560 TMC), Karnataka (700 TMC), and Andhra Pradesh (800 TMC);
- The expected return flow by 1998-99 would be 25 TMC allocable to Maharashtra, 34 TMC to Karnataka, and 11 TMC to Andhra Pradesh;
- The evaporation losses from reservoirs of projects using 3 TMC or more annually shall be excluded in computing the 10 % figure of the annual utilizations;
- The Party States will be free to make use of underground water within their respective territories;
- The Award (all or any of the clauses) can be altered, amended or modified by agreement between the parties or by Legislation of Parliament; and
- The Tribunal's order is to be reviewed or revised by a competent authority or Tribunal at any time after 31 May, 2000, but such review or revision shall not, as far as possible, disturb any utilization that may have been undertaken by any State within the limits of their allocated shares.

The Tribunal, in its report discussed two schemes namely, Scheme "A" and Scheme "B". In the Final Award, the Tribunal mentioned only the Scheme "A" (GOI, 1976). The Tribunal's report states that scheme "B" can be implemented if all three States agree. There is also a provision of setting up of a Krishna Valley Authority under Scheme "B", as well as specifications on the distribution of flows in excess of 2060 TMC among the three States. A complete scheme "B" drawn up by the Tribunal is given in their Further Report of 1976.

The Tribunal Award could be reviewed by a competent Authority or a Tribunal on any date after 31st May 2000, without disturbing any utilization undertaken by the States within the limits of their allocated shares. One of the upper riparian States (Karnataka) has filed a petition in the Supreme Court on 29 June 2001 seeking the Court's directive to

restrain Andhra Pradesh from taking up any new projects on the Krishna River until the water sharing issue is settled again. Thus, even before the issue could be taken up for conciliation, the matter has reached the Court. At the request of the three riparian states, the setting up of a Review Tribunal has been approved.

Implementation

The World Bank’s India Water Sector Review report of June 1998 sums up the implementation of the Tribunal Award stating “The Krishna Water Dispute is a good illustration of how water tribunal awards could result in competitive disjointed investments aimed at establishing claims to water when the awards come for review.” This is the main reason why the States, racing against time, tried to establish rights to certain projects, leading to disputes on the interpretation of the Award. A case in point is the Upper Krishna Project (Alamatti dam). This dispute is elaborated below. The Supreme Court has ruled on this matter and the case law is of interest.

Alamatti case

The Award permits the States to reallocate their share of water from other projects. Karnataka, in formulating the scheme for the Upper Krishna Project did some reallocation. It revised the earlier allocation of 155 TMC made for this project to utilization of 173 TMC by reallocation from other projects. In doing so, it envisaged a Stage II proposal to keep the top level of the gates at 521.0 m, which provides for storing extra water. Karnataka further modified this in April 1976, with FRL 524.256 m against the earlier level of 518.7 m., justifying that the additional storage above the prescribed limit of 173 TMC would be utilized only for hydropower generation and the discharge would be let back into the Krishna River.

Andhra Pradesh has stated that the extra storage above the level of FRL 518.7 m was ultra- vires (not in accordance with the provisions of the Law) under the Award. They also pointed out that the Award allows for generation of hydropower as part of beneficial use, and has to be accounted within the overall allocation of water to the Basin States. Andhra Pradesh also expressed apprehension that, apart from allowing Karnataka to store

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extra waters, there will be drastic reduction in the flows during the months of June, July and August, which in turn will affect the power generation at Srisaïlam and Nagarjunasagar dams and also the agricultural operation in Krishna and Nagarjunasagar Commands during these months.

The Central Government's efforts to resolve the issue as directed by the High Court did not succeed. A political solution was attempted but suits were filed in the Supreme Court in 1997. Karnataka argued that the Union Government should be directed to notify Scheme "B" of the Award, and constitute the Krishna Valley Authority. Andhra Pradesh requested that the Government of Karnataka should not raise the height of the Alamatti dam beyond level 509.0 m. A Five Member Constitutional Bench heard the original suits of both the States and delivered its judgment on 24th April 2000, restricting the height of the Alamatti Dam (SC, 2000). The Court has ruled that there is no bar for raising the height of the dam at Alamatti up to 519.6 m, subject to getting clearance from the appropriate Authority of the Central Government and any statutory Authority required under law including clearance from the Ministry of Environment and Forests.

Telugu Ganga Project (TGP)

There is another dispute arising out of differing interpretations of the Award by Andhra Pradesh and Karnataka. The award allows Andhra Pradesh (AP) the use of surplus water without conferring a prescriptive right. AP claims that TGP is just that it utilizes the surplus water of Krishna. Karnataka is concerned that AP will claim prescriptive rights on this water, when the award comes up for review. The Conflict continues.

Cauvery Basin

An Inter-state River basin in the southern peninsula lies in the States of Karnataka, Kerala, Tamil Nadu and Pondicherry. During the 200 years of British rule, until India attained independence in 1947, substantial development of irrigation took place in the deltaic plains of Tamil Nadu and only partly in the princely State of Mysore, now Karnataka. The two important storage projects of the pre-independence period are the Krishna Raja Sagar dam (1931) in Karnataka and the Mettur dam (1934) in Tamil Nadu.

Prior to these two dams, the Tanks and Anicuts (ungated diversion structures) dominated the irrigation development in the basin. Since independence, the pace of development has been remarkable, and almost 95 % of the surface water is reported to be utilized, which is the highest for any basin in the country.

The earliest Agreements that governed the use and development of the Cauvery waters are the 1892 and 1924 Agreements between the erstwhile princely State of Mysore and the province of Madras. These are the Agreements on which the case of the Cauvery Water Dispute hinges, with Karnataka calling it unjust while Tamil Nadu swears by its validity considering their established prescriptive rights. Tamil Nadu had the advantage of initiating development in the basin (delta) much earlier than the other States of Karnataka and Kerala and could therefore utilize a much higher proportion of the yield than that generated in its own catchment. The State of Kerala was not a party to these Agreements.

Cauvery Tribunal

The 1924 Agreement, a water sharing agreement, came up for review at the end of its 50 years of validity, and since then the sharing of the waters of the Cauvery remained under discussions between Karnataka and Tamil Nadu, with the Government of India (GOI) acting as a mediator. The course of the negotiations from 1968 to 1990 until the Tribunal was set up, at the bilateral level and at the Central level, swung from periods of hope to periods of despair. Even before the 50 years validity period expired, Tamil Nadu approached the GOI to refer the dispute to a Tribunal, and in the absence of any response from the Central Government, approached the Supreme Court requesting for a direction to be given to GOI to set up a Tribunal and to direct Karnataka not to proceed with its new projects. Kerala also filed suits to refer the disputes to the Tribunal.

Efforts by the Central Government at negotiation to find a solution did not result in the settlement of the dispute. The writ petition of the Tamil Nadu Government was heard by the Supreme Court in April 1990, and it directed the Central Government to set in motion the legal proceedings, as statutorily mandated. The Cauvery Waters Dispute Tribunal

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was accordingly set up in June 1990 for adjudication of the dispute. The cases made out by the Party States are summarized below:

Karnataka

- i) The Agreements of 1892 and 1924 are void since they were 'imposed' by the British on the 'vassal Princely State' of Mysore;
- ii) The 1924 Agreement has expired in its entirety in 1974 at the end of the 50 year period, the 1892 agreement placed restrictions on Karnataka for the development of irrigation, while Tamil Nadu had no corresponding restrictions;
- iii) Tamil Nadu has the benefit of being exposed to both the South-West and North-East monsoons;
- iv) Tamil Nadu's canal systems are to be modernized;
- v) Karnataka's drought prone area is almost double that of Tamil Nadu, and has therefore a right to use of more water;
- vi) Trans - basin diversions for irrigation or power should not be permitted;
- vii) The ground water resources in the Delta region are to be taken into account for the purpose of equitable distribution.

Tamil Nadu

The Central Fact-Finding Commission's (CFFC) reports of 1972 and 1973 with regard to yield and utilization should be revised. The average annual utilization is already higher than the yield, even at 50 % availability, and hence there is no scope for savings. The 1892 and 1924 agreements are considered inviolable, binding on all the States. There is thus little to be gained from working out any fresh allocation of waters in terms of actual amount or periodic releases.

Kerala

The allocation of Cauvery waters should be made taking into consideration the amount and percentage contribution of each State.

Pondicherry

The full allocation of a minimum quantity of 9.355 TMC of water for irrigation and drinking water purposes should be made during normal years.

Interim Relief/Award

Tamil Nadu requested the Tribunal for interim relief. The Tribunal heard the petitions of the States, after the Supreme Court ruled that interim relief was part of the reference before the Tribunal. The Tribunal gave an interim order on 25 June 1991 (GOI, 1991). Karnataka was directed to release 205 TMC of water from its reservoirs so as to ensure that it is available in Tamil Nadu's Mettur Reservoir in a year from June to May, effective from 1 July 1991, in accordance with the monthly inflows schedule. Restrictions were also placed on Karnataka not to increase its area under irrigation by the waters of the Cauvery beyond existing 11.2 lakh (100,000) acres.

Karnataka felt aggrieved and reacted very strongly to the above order and raised several legal and technical lacunae, some of which are mentioned here: the interim relief is arbitrary, granted without prima facie assessing the yield, utilization, basin needs and

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other relevant matters; unworkable schedule for the release of water arbitrary since it operates irrespective of availability of waters in Karnataka etc. It also represented to the Central Government not to implement the Tribunal's order, and to stay all the proceedings of the Tribunal until a National Water Policy was formulated and an appropriate amendment was brought to the Inter-state Disputes Act of 1956, and the Tribunal given clear guidelines (CWDT, 1995). Due to the urgent nature of the matter, GOI approached the Supreme Court seeking clarifications.

The Supreme Court ruled that the order of the Tribunal be published in the official gazette. The Tribunal upheld its order. Following this, there was political one-upmanship in both the States. Until the end of the 1994-95 season there was no crisis as the monsoon was favorable. However, in 1995, due to delayed monsoon and low flows in the river, the dispute again came up before the Supreme Court on the issue of noncompliance of the Tribunal's order by Karnataka. The Supreme Court, in December 1995, asked Tamil Nadu to approach the Tribunal.

The Tribunal directed Karnataka to release 11 TMC, being the cumulative deficit up to mid December 1995, and to keep up further release of 17.4 TMC until end of May. Karnataka did not release the flows as directed by the Tribunal. The Supreme Court on a petition by Tamil Nadu requested the Prime Minister to intervene and find a solution within three days.

The Prime Minister of India (PM), after intense parleys and discussions with the Chief Ministers of the States, announced a three-point package, which defused an otherwise explosive situation. The details of the PM's package are mentioned below:

- Package 1- PM requested Karnataka for immediate release of 6 TMC of Cauvery waters, against 11 TMC as per the Tribunal Order, to Mettur in Tamil Nadu. This was complied with. (In subsequent years, this is being done under a formalized institutional arrangement as explained further);
- Package 2 - A three member Expert Group was set up to make an on the spot assessment of the status of standing crops in Cauvery ayacuts in Tamil Nadu and

Karnataka and their water storage levels and immediate requirement of water to save standing crops in both the States. This was only an interim action to defuse an otherwise sensitive situation. Such solutions may soon become necessary in exceptional cases in the future. (There is now an established institutional arrangement to undertake any such tasks).

- Package 3 - This addressed the larger issue of sharing of river waters at a policy level by proposing to hold a meeting of the National Water Resources Council (NWRC), on which all the Chief Ministers are represented, to evolve guidelines for sharing of Inter-state river waters. This meeting has been held and a Working Group has been set up to work out the modalities for preparing the guidelines. Recently, in May 2001, the Working Group set up under the Chairmanship of the Minister of Water Resources, GOI and of all the State Irrigation/“Water Resources Ministers of the States as Members, held a meeting to discuss the guidelines.

Cauvery Water Scheme -The Cauvery River Authority

Tamil Nadu filed a suit in the Supreme Court on the grounds that Karnataka was not following the directives given by the Cauvery Water Disputes Tribunal. It asked, inter-alia, to pass a decree of mandatory injunction, directing the Union of India to frame a scheme making provisions for all matters necessary to give effect to the decisions of the Tribunal, and to issue a notification thereof in the official gazette. In pursuance of the Order given by the Supreme Court, the Central Government notified a scheme called "Cauvery Water Scheme" under Section 6 A of the Inter-State Water Disputes Act, 1956 on 11 August 1998, to give effect to the Interim Order and all subsequent orders under which "The Cauvery River Authority" was set up. The Prime Minister chairs this Authority, and Chief Ministers of the basin States are its Members. The Secretary, Ministry of Water Resources, is the Secretary of the Authority.

The “Monitoring Committee” which is headed by the Secretary, Ministry of Water Resources, GOI assists the Authority. The Chief Secretaries and Chief Engineers of the Cauvery Basin States and the Chairman, Central Water Commission are Members of the Committee. While meetings of the Authority and the Committee are being held, the

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Tribunal is proceeding with its hearings and its Final Award is eagerly awaited. It remains to be seen whether the award will end the conflict.

The Cauvery Water Dispute has become highly litigious and hostile this year (2002). High politicking surrounds the dispute, arising from the reported severe shortfall in the Southwest monsoon rainfall this year. This has created a very low storage situation in the four key reservoirs, particularly of the Krisnarajasagara and Kabini reservoirs in Karnataka state, from where releases are made to the Mettur reservoir in Tamil Nadu.

Water releases of 205 billion cubic feet (BCF = thousand million cubic feet, Mcf), the bulk of the releases from the two reservoirs mentioned above, are to be made by Karnataka state from June to May every year, to the Tamil Nadu State, in accordance with the Interim Award of the Cauvery River Water Tribunal. The State of Tamil Nadu, unable to get the water released as provided in the award, has constantly knocked at the doors of the Supreme Court of India and the Cauvery River Authority (CRA) headed by the Prime Minister, for providing redress. The Cauvery Tribunal set up in 1990 under the ISWD Act has yet to give its final report.

On a petition by the Tamil Nadu State, the Supreme Court, duly noting that the storage quantity in the four reservoirs of Karnataka had increased from about 41 TMC to about 73 TMC in August, passed an interim order directing Karnataka to release 1.25 TMC of water every day to the Mettur reservoir in Tamil Nadu till a final decision was taken by the CRA. The Court's order also stated that "The CRA is requested to finally decide the dispute between the states with regard to pro-rata sharing of water by the Cauvery river basin states, especially in times of distress".

Following the Supreme Court's order, the CRA met on an emergency basis, reviewed the situation, and ordered on September 8, 2002 the release of 0.8 TMC of water daily by Karnataka. However, Karnataka did not honor the order, citing again the reason that any release of water as per CRA's order would be harmful to the standing crops in the state. Taking cue from the reluctant attitude of the Karnataka Government, the Ryots (farmers)

of the state in the Cauvery basin resorted to rioting and forced the Government (which was more than willing anyway) to stop releases from the reservoirs. The Government of Karnataka, in turn, is trying to prove that the farmers did not take kindly to the decision of the SC and that the situation has gone beyond its control.

The Tamil Nadu Government again filed a petition in the Supreme Court seeking initiation of contempt proceedings against the Chief Minister of Karnataka and four others on the ground that the state had violated Supreme court's order for release of 1.23 TMC water every day as well as the CRA order for release of 0.8 TMC of water daily. The Supreme Court, after getting report from the Cauvery Monitoring Committee, and after hearing the pleas of both the state governments, in its order of 4th October 2002, observed that "We are at present concerned with the plight of the farmers, be they of Tamil Nadu or of Karnataka" and directed that "Water is directed to be released by Karnataka in the manner indicated in the September eighth order of CRA headed by Prime Minister".

When Karnataka repeatedly contended that release of more water to Tamil Nadu would adversely affect the standing crops, the court said, "You (Karnataka) shall obey the CRA order but it is open to the CRA to change its order." But the ground situation has not altered. In fact, the position of Karnataka has hardened. The State Cabinet has taken a decision not to release water to Tamil Nadu as per CRA order and most of the political parties in the state have supported the stand of the Government. In its Report to the Supreme Court, the Cauvery Monitoring Committee had highlighted the severe drought conditions in both the states and stated that the water level in the reservoirs in the states had been at the lowest.

Matinee idols of the film world in Tamil Nadu and Karnataka have joined the chorus of protests; in Karnataka they have urged stopping the screening of Tamil films and TV programs, apart from stoppage of release of Cauvery water to Tamil Nadu, while in Tamil Nadu they have urged the state to stop electricity supply to Karnataka from its Power station at Neyvelli till Karnataka agrees to release Cauvery water as per Court's

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orders. The Tamil Nadu Government has also filed a second petition of contempt of Court against Karnataka for violating the Supreme Court's orders.

A distress sharing arrangement, as between Bangladesh and India at Farraka, is very much a feasible proposition, but the political expediency in both the states has become the driving force in perpetuating the dispute. It is a hard nut to crack and the Prime Minister as the Chairman of the Cauvery River Authority is faced with a highly explosive situation. The defying of the highest court's order by Karnataka has also created a constitutional crisis. Can a state government for its own narrow goals of electoral politics, defy the orders of a constitutional authority (Tribunal), the apex judicial authority (Supreme Court) and the Country's highest executive authority (The Prime Minister) and still be free of blame?

The Pennar Basin

The Pennar basin, with a drainage area of 55,233 sq. km, lies in the States of Karnataka (6,937 sq. km) and Andhra Pradesh (48,276 sq. km). The basin is semi-arid and drought - prone. The ultimate irrigation potential of the basin has been assessed as 0.19 M ha., of which 0.13 m ha are already being used. The average annual runoff has been estimated at 6.86 BCM, which has also been assessed as the utilizable flow. The present surface water use is reported to be 5 BCM, out of which the storage in reservoirs is 2.51 BCM including projects under execution. There are no sites for major projects and no hydroelectric potential in the basin.

Development during the pre-plan period consisted mainly of medium and small irrigation projects. The only major project in the basin is the Somasila Project, which is under construction.

The earliest Agreement of water sharing and projects dates back to February 1892, when the Princely State of Mysore signed an agreement with Madras Presidency (included the present State of Andhra Pradesh) for the restoration of irrigation works and the construction of new irrigation works (CWC, 1995 & 1997). The next Agreement was in 1933 between the same Parties for the restoration of anicuts, construction of new anicuts,

tanks and distribution of water of tributaries of the Pennar and from irrigation canals and deficient supplies in some rivers. The 1892 agreement is now being reopened by the States on the ground that tanks are being improved or diversions effected from tanks without prior approval between the States. Karnataka has taken legal recourse to settle the matter.

Brahmani-Baitarani Basin

The combined basin of Brahmani and Baitarani has a drainage area of 51,822 sq. km which lies in the States of Orissa (34,749 sq. km), Bihar (now Jharkhand) (15,757 sq. km) and Madhya Pradesh (1,316 sq. km). The Brahmani River rises near Nagri village in the Ranchi district of Jharkhand, and has a total length of 799 km. The Baitarani River rises in the hill ranges of the Keonjor district of Orissa, and has a length of about 355 km. Both river systems drain into the Bay of Bengal and form a common delta area. The important tributaries of Brahmani are the Karo, the Sankh, and the Tirka and those of the Baitarani are the Salandi and the Matai. The basin has a cultivable area of about 3.2 m. ha. The average annual natural run-off is assessed to be 36.23 BCM out of which the utilizable flow is 18.30 BCM. The hydropower potential has been assessed as 548 MW at 60% load factor from 17 identified schemes. Only one project with installed capacity of 135 MW has been completed.

There is a long history of Irrigation in the basin. The most Important project of the pre-plan period is the Orissa Canal system. During the Plan period, many important projects have been built or are under construction, such as the Salandi Project, the Rengali Multipurpose Project on the Brahmani, and the Andpur Barrage on Baitarani. There is adequate water, which could be developed for beneficial uses by storage projects and ground water exploitation. Taking up the various projects under consideration can increase the present storage capacity of 4.76 BCM to about 14 BCM in the future.

There are no Inter-state disputes of any significance, as all projects are taken up by mutual agreements among the Party States. The basin has surplus water flows and hence the sharing arrangements have not created disputes so far.

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The Subarnarekha Basin

The basin has a drainage area of 19,296 sq. km, and lies in the States of Bihar, Jharkhand, West Bengal and Orissa. The ultimate irrigation potential from the existing and ongoing projects is assessed to be 1.02 M ha, of which 0.5 M ha. have already been developed. The storage potential assessed is 4 BCM, of which 0.5 BCM is currently in place. The hydroelectric potential is assessed at 52.5 MW at 60% load factor, whereas the present installed capacity is 43 MW.

The development of water resources in the basin in the pre-plan period was limited to medium and minor irrigation projects. The pace of irrigation development picked up momentum during the Plan period. There are three major projects under implementation following several Inter-state water agreements negotiated since June 1964. The Agreements signed in June 1964 were on assessment of water availability at specific locations on the River and the requirements of each State. The assessed potential of 4.5 MAF at 75% availability was allocated as follows: to Bihar 3.2 MAF, Orissa 1.2 MAF, and 0.1 MAF to West Bengal.

The projects under implementation under subsequent project - specific agreements between States are (i) the Subarnarekha Multipurpose Project, (ii) the Chandil Dam with a specific flood cushion, (iii) the Kharki Dam and Galudih Barrage with Canal system. The storage under each dam and its sharing and the costs and benefits sharing from each project between the Party States have been specifically defined, including the ratio of sharing shortages in the proportion of their respective water shares. Joint operations of the Kharki Dam and the Galudih Bararge along with the Right Bank Canal have been agreed. Orissa, as the lowest riparian, has the right to use the surplus water from the free catchment below Kokpara.

The Mahi Basin

The drainage area of the Basin is 34, 842 sq. km, which lies in the States of Rajasthan (16,453 sq. km), Gujarat (11694 sq. km), and Madhya Pradesh (6695 sq. km). The Mahi River is the main artery in the Basin, which rises in the northern slopes of Madhya

Pradesh and flows for about 583 km. before flowing into the Arabian Sea through the Gulf of Cambay. Important tributaries of the river are the Som, the Anas, and the Panam. The cultivable area of the Basin is 2.21 M. ha. The utilizable surface water has been assessed (CWC, 1989) at 31.0 BCM (average annual runoff 118.3 BCM), of which nearly 81% is the reported beneficial use.

Important major projects in the basin are the Kadana Dam (Mahi Project) and Panam in Gujarat, Mahi Bajaj Sagar and Jhakam in Rajasthan, and Mahi in Madhya Pradesh. The live storage capacity created in the reservoirs is 4.75 BCM. The hydropower potential in the basin has been assessed as 68.6 MW at 60% load factor. Most of the potential has been developed with three projects. The ground water utilization is about 25% of the utilizable potential.

The Riparian States have negotiated several project - specific agreements since 1966, for sharing of water, sharing of costs of land acquisition, resettlement and rehabilitation, and the sharing of benefits. There is also a proviso for cost reimbursement by Rajasthan to Gujarat, subsequent to the development of the Narmada river to provide water for Mahi at a later date. These agreements have worked well.

Tapi Basin

The basin drainage, extending over an area of 65,145 sq. km, lies in the States of Maharashtra (51,504 sq. km), Madhya Pradesh (9804 sq. km), and Gujarat (3837 sq. km). The main artery of the basin is the Tapi River, which rises in the Betul district of Madhya Pradesh and flows over a length of about 724 km. before flowing into the Arabian Sea through the Gulf of Cambay. The important tributaries of the river are the Purna, the Panjhra, the Vaghur, the Bori, and the Aner. The cultivable area of the basin is about 4.29 M. ha. The average annual runoff is assessed at 18.0 BCM, out of which the utilizable water is 14.50 BCM (CWC, 1989). The hydropower assessment in the basin is 119.7 MW at 60% load factor. Two projects using 70% of the assessed potential have been completed. The Pre-Plan development of irrigation was mainly through medium and minor projects. Important projects developed in the basin during the Plan period are the Ukai dam, Kakrapar diversion weir, and the Girna dam. The Upper Tapi and Wagnur

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projects are under construction. About 25% of the assessed ground water potential has been realized.

The States of Maharashtra and Madhya Pradesh have negotiated several agreements for the sharing of waters, and for specific projects upstream of the Ukai dam in Gujarat. The Ukai project in Gujarat was cleared by GOI subject to the upstream utilization of 261.4 TMC (6 MAF) at 75% availability for Maharashtra and Madhya Pradesh. The latter two States entered into an Agreement on 12 January 1986 to share 261.4 TMC, with allocation of 70 TMC to Madhya Pradesh and 191.4 TMC to Maharashtra (CWC, 1989). These two States have entered into several other project - specific Agreements since 1964, with specified allocations of storage to each State, and benefit and cost apportionment, with an Inter-state Control Board for efficient, speedy and economical investigation and execution of Joint Projects.

West Flowing Rivers from Tapi to Kanyakumari

The Issue of Mulla Periyar Dam

This basin of west flowing rivers is a composite of 115 rivers extending over an area of 112,117 sq. km. The rivers are in the States of Gujarat, Maharashtra, Goa, Karnataka, Kerala, and Tamil Nadu. All these rivers have a coastline on the west and experience high rainfall. Consequently, they have good water resources.

One of the 115 rivers of interest, from the conflict resolution angle, is the Periyar River in Kerala. It has one of the oldest inter-basin water transfer schemes in which the west flowing waters of the Periyar River are diverted from the Mulla Periyar Dam (built during 1885-1897) located in the Basin, to the east for power generation and irrigation in Tamil Nadu. The ownership and operation of this dam is vested in the Government of Tamil Nadu under the Agreement of October 1886 between the Maharaja of Travancore & Madras State, with a validity of 999 years. This lease deed was revised and amended in 1970 permitting Tamil Nadu to use Periyar Waters for power generation. However, in 1979, press reports in Kerala about damage in the Periyar dam prompted an examination

of the safety aspects of the dam by the Central Water Commission, and consequently Tamil Nadu undertook strengthening measures.

Even after undertaking strengthening measures, the Government of Kerala has restricted the conservation level in the reservoir due to apprehensions about the safety of the dam. Kerala initially objected to the intervention for conciliation by the Government of India. Several Writ petitions were filed during 1997-99 in the High Court of Tamil Nadu in Chennai, and in the High Court of Kerala in Trivandrum. The Government of Tamil Nadu followed it up with a transfer petition in the Supreme Court, requesting the transfer of all the cases related to Mulla Periyar Dam from High Courts of Tamil Nadu and Kerala.

The Supreme Court directed the Minister, Water Resources, GOI to convene a meeting of the Chief Ministers of the States to amicably resolve the issue and convey the outcome to the Court before the case came up for hearing in July 2000. The Minister (WR) convened this meeting, and an Expert Committee was set up to inspect the dam from the dam safety angle vis-à-vis the status of strengthening works carried out by the Tamil Nadu Government, and give recommendations with regard to the raising of water level in the dam in a phased manner. The Court was informed accordingly and as a follow up, the Expert Committee headed by Member (D&R), Central Water Commission was set up with Chief Engineer (Design/Dam safety) of Government of Tamil Nadu and Chief Engineer of Kerala and other eminent engineers as Members.

The Committee has finalized its report and submitted it to the Central Government for necessary action. It is understood that the Expert Committee has recommended the raising of the conservation level. The matter is yet to be resolved. Kerala's official objection, as stated in the Court, is that raising the conservation storage level will result in the submergence of reserve forest land and the Elephant Wild Life Sanctuary.

Conclusions

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The mechanisms for conflict resolution need to be expedited. The processes of conflict resolution, as brought out above, are complex and time consuming. In order to resolve the issues amicably at all levels, the following approaches are recommended:

The resolution of Inter-state water disputes through negotiations, and through the three Tribunals (Narmada, Godavari, and Krishna), and the providing an Interim Award by the Cauvery Tribunal, the Supreme Court's judgments on Interim Award on Cauvery, the resettlement and rehabilitation of Project affected people in the Sardar Sarovar Project and the Alamatti dam issue, all have provided valuable principles that could be culled out and included in the Guidelines that the Central Government is now preparing as a part of the National Water Policy for sharing of Inter-state Rivers. In this context, the Indus Treaty with Pakistan, the Mahakali Treaty with Nepal, and the Treaty on Ganges Water Sharing at Farakka with Bangladesh would also provide useful principles.

The time tested method of ' negotiations ' with the Parties to the dispute to reach agreements would be an ideal solution, as the Parties to the dispute would be prepared to discuss a number of alternatives in a cooperative effort to find the best alternative which is acceptable to all the Parties. The time period for such negotiations could be dictated by the gravity of the issue, but there should not be any uncertainty in it.

In cases where all negotiation efforts have failed, the reference to setting up a Tribunal under the Inter-state Water Disputes Act should be resorted to. Even in this case, certain amendments are essential. These are:

- a) Introducing a time limit to the setting up of the Tribunal from the time a reference is received by the Central Government;
- b) The Central Government, if after fixing a time frame to the States to arrive at a negotiated settlement, finds that such settlement has not been possible, should on its own, set up the Tribunal *suo moto*;
- c) The Act should introduce a time frame (not exceeding three years, including extensions) clause for the Award by the Tribunal;

- d) An age limit for the Chairman, Members and assessors of the Tribunal should be fixed;
- e) The Award should have the same force and sanction behind it as an order or decree of the Supreme Court, to make the Tribunal's Award binding;
- f) Disputes, once settled, should not be reopened;
- g) The Tribunals should also hear the views of the Stakeholders;
- h) The decisions of the Inter-State Council on the Sarkaria Commission's Report on Inter-state matters regarding the steps to be taken on the ISWD Act should be implemented.

Track II diplomacy has worked well in recent years in bilateral negotiations with neighboring Trans-boundary countries, and has facilitated settlement of the Ganges Treaty with Bangladesh and the Mahakali Treaty with Nepal. With increasing objections of stakeholders to development projects, and the proliferation of Public Interest Litigations by NGOs and other stakeholders, this kind of diplomacy may be fruitful in resolving Inter-state water issues.

It is now being suggested that the conflict resolution process needs a shift from a purely legal and inter - Governmental matter to a humanitarian approach, based on peoples' participation and cooperation, in which all stakeholders and partners (including the project affected people who are the victims) should come together on one platform to find viable solutions. In this context, initiating action on the above and following the suggestions, particularly in the Guidelines on water dispute resolution being evolved by a Ministerial Working Group set up by the NWRC, would be timely.

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C. CASE STUDIES OF WATER CONFLICTS IN BANGLADESH

Farmers vs. Fishers*: Land and Water Use Conflicts

(*The term ‘fisher’ is used here, instead of the conventional word ‘fishermen’, in order to emphasize that the fishing community includes both men and women).

Bangladesh possesses enormous wetland areas, of which the principal ones are the rivers and streams, freshwater lakes, and marshes including water bodies locally known as *haors*, *baors*, *beels* and *jheels*. Haors are bowl-shaped depressions (often tectonic in origin) between the natural levees of rivers. These are subject to monsoon flooding every year, but may shrink in the dry season. These are mostly found in northeastern Bangladesh – generally known as the Sylhet Haor Basin. Beels are a combination of freshwater marshes, lakes and swamp forests, as well as the deepest parts of haors, which remain as perennial water bodies. An important beel of great ecological significance is the Chalan Beel in northwestern Bangladesh. Baors are actually ox-bow lakes, formed due to the detachment of a meander from the main stream, and are common in southwestern Bangladesh, while jheels are freshwater marshes of varying sizes.

Some authors estimate the total area of wetlands in Bangladesh as between seven and eight million hectares, or about 50 percent of the total land surface. This includes estuaries and large tracts of mangrove swamps (the Sundarban forest). However, in realistic terms, the wetlands of Bangladesh cover an area of about 16,000 sq km, which is around 11 percent of the total area; these include rivers, haors, lakes and ponds. Such coverage is much higher than the global average of six percent. The wetland ecosystem contains very rich components of biodiversity. Of more than 5000 species of flowering plants and 1500 vertebrate species in Bangladesh, wetlands provide the habitat for about 300 plant and over 400 vertebrate species (Nishat et al., 1993).

Wetlands are the also the habitat for a large number of resident and migratory waterfowl, including a number of endangered species. Fisheries are the most important use of the Bangladesh wetlands. Fisheries play a dominant role in nutrition, employment and

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foreign exchange earnings. Fish provide nearly 70 percent of the animal protein intake, account for five percent of the GDP and about 12 percent of the export revenues. About one million people are directly employed in fishing, and another 10 to 12 million are employed in fish marketing and processing.

The majority of the rural households are engaged in seasonal fishing activities during the dry season (November to March). The wetlands become interconnected with links to the river channels in the wet season, and provide ideal habitats for the breeding cycle of a large number of fish species. The increase of the human population and the demand for more agricultural land has adversely affected the wetland ecosystem. Indeed, wetlands in Bangladesh provide a typical instance of conflicts in utilization and allocation of a resource between two important water-using sectors: farming and fishing.

Development activities in the wetland areas are mainly aimed at reduction of the flood level and size of wetlands to facilitate agriculture. The flood protection embankments (primarily constructed to reduce crop losses from flooding) have considerably altered the natural hydraulic regime. Increased withdrawal of water for irrigation, drainage of flooded areas for cropping, and other flood control measures have a dramatic impact on open water fisheries through reduction in the size of fish habitats, and prevention of the movement of fish. The farmers, on the one hand, are inclined to increase their crop output through wetland conversion, but the fishers, on the other hand, are disadvantaged in maintaining a sustainable livelihood as their habitats continually shrink.

Wetlands are the home of several hundred varieties of rice. Traditionally, deepwater (floating) rice or broadcast *aman* rice used to be the dominant crop in the use of wetlands. With the introduction of high yielding varieties (HYVs) and flood control, drainage and irrigation measures in the wetlands, cropping pattern has changed in favour of *boro* (winter) rice. Drainage of wetlands has diminished fish output, but increased both cropped area and cropping intensity. Of the three rice crops grown in Bangladesh – *Aus* (pre-monsoon), *Aman* (monsoon), and *Boro* (winter) – *Aman* is the leading crop, while *Boro* traditionally used to be the least important in terms of area. However, in recent

years, due to the increased availability of land from drainage of wetlands, *Boro* now occupies the second place (in area) among the three rice varieties. (The proportional area coverage of the three rice varieties is: *Aman* [56 percent], *Boro* [27 percent] and *Aus* [17 percent]).

The conflict in utilizing and allocating land and water between farmers and fishers is a continuous problem in water management in Bangladesh. Neither sector can be marginalized if the goal is to attain food security and a balanced diet. For the past 30 years, national planning pivoted around the objective of making the country self sufficient in food. Hence, special emphasis was given on agricultural expansion as well as protection of farmlands from floods in order to minimize crop losses. The interests of farmers thus received priority and the interests of fishers were neglected. The cumulative result was a reduction in fish habitat, fish population, and diversity.

Heavier emphasis on agricultural growth and protection of crop lands from floods is not to be blamed, because the country – with its runaway population growth – has averted serious food scarcity situations, and has indeed become self sufficient in rice production in 2000. The fault lies in myopic planning strategies which were oblivious to, or did not take due consideration of, the needs of the fishers and the fish habitat.

Conversion of wetlands into farmlands has not only altered the land use pattern, but also changed the entire natural landscape. Many partial flood control projects with the construction of submersible dykes have been taken up to protect *boro* rice from pre-monsoon flooding. Full flood control projects have also been implemented for providing a controlled water regime for agriculture. Projects for drainage facilitation have also been undertaken. Flood control, drainage and irrigation structures reduce floodplain size and obstruct fish movement and migration from rivers and the beels to the floodplains for breeding and feeding. River closures and barrages – both major and minor – obstruct the upstream and downstream migrations of fish populations, and thereby inhibit their sustenance and reproduction. The barrages and closures also change the flow pattern, which adversely affects fish species composition and diversity.

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The conflict in land and water use between the farmers and the fishers is a recurrent annual phenomenon in the haor and beel areas. In the months of November and December, when the farmers need rapid drainage of water from their rice fields to start cultivation, the fishers resist and often put bunds across drainage canals to protect their fish. Later, in February, when the farmers need water to irrigate their lands, the fishers want to decrease water levels in the beels to maximize the catch. Besides, water control regulators built across the irrigation or drainage canals are a major impediment to fish migration during the early monsoon breeding season.

Impacts of flood control, drainage and irrigation (FCDI) infrastructures have been studied in detail under the Flood Action Plan (FAP) component of the “Northeast Regional Water Management Project: FAP 6” (WRPO, 2000). It was identified in that study that some of the impacts have been positive; however, there are some serious adverse impacts of major environmental concern. It was established that changes in cropping patterns and increased rice coverage have brought higher financial returns. Reduced flood depths and duration have led to a transition from deepwater broadcast *Aman* rice to transplanted *Aman* and HYV *Aman* in the wet season, and proliferation of HYV *Boro* cultivation in the winter season.

The FAP study also found that the FCDI activities have a major negative impact on open water or capture fisheries due to substantial reductions in the areas of regularly inundated floodplains and beels. Many fishers have lost their livelihoods and been forced to look for alternate occupations. The magnitude of these losses from conflicts between the interests of farmers and fishers appears to be substantially greater than has been previously estimated (WRPO, 2000). Such conflicts are the direct result of the absence of an integrated flood protection and fisheries planning strategy in the water sector, a lapse that is receiving remedial attention only now.

The National Water Policy (NWPo), formulated in January 1999, makes a firm commitment to a more equitable allocation of water rights and sharing among the

different water using sectors (GOB, 1999). In recognition of the water requirements for open water fish and the fishing community, specific clauses (given below) have been included in the NWPO:

- *Natural water bodies such as beels, haors and baors will be preserved for maintaining the aquatic environment and facilitating drainage;*
- *Water bodies like baors, haors, beels, roadside borrow pits etc. will, as far as possible, be reserved for fish production and development. Perennial links of these water bodies with the rivers will also be properly maintained;*
- *Water development plans will not interrupt fish movement and will make adequate provisions in control structures for allowing fish migration and breeding.*

The National Water Management Plan (NWMP), now in its final stage of completion, has also stipulated that water structures should be so designed and operated that there are no major obstacles or danger points on the migration routes of fish (WRPO, 2002). The NWMP also recommends that fish passes or gates be included in all regulators and be kept open as far as possible, but especially in the key migration months. Strategies for fish and fisheries management are to be agreed at local levels, so that potential land or water use conflicts (especially with the farmers) are avoided, or at least minimized. The basic premise is that there has to be a symbiotic balance between the two interest groups: the fishers and the farmers – who need water at different times and in different quantities.

Fish passes for the mitigation of the adverse effects of FCDI works are now fully recognized in water sector planning in Bangladesh, although substantial construction of such passes is yet to begin. During the formulation exercise of the NWMP, an evaluation study was conducted in 1999 for one fish pass Pilot Project, completed in 1995 in Sylhet (WRPO, 2000). A vertical slot-type fish pass was installed at the Manu River Irrigation Project in Sylhet, to facilitate fish migration between Kawadighi Haor, an important fishing ground that had been enclosed by the Manu River Irrigation Project and the Manu river. The evaluation study concluded that the fish pass has been very successful, and has resulted in a substantial increase in fish production in Kawadighi Haor.

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Increased fish production has also contributed to a significant increase in the average daily income of the fishers, as well as in the household consumption of fish during the post-construction period. No significant disbenefits from the fish pass operation were reported. There were concerns that the inflow of water to the haor resulting from the fish pass operation in the pre-monsoon and monsoon seasons would cause some flood damage to crops. However, no such adverse effect on crops was observed, probably because the volume of inflow (about 0.6 cumec) was too low to cause any significant increase in water depths.

It is now recognized that the conflicts between the farmers and fishers on water use and allocation can be positively addressed through policies of social equity, enforcement of committed programs and effective participation of people at grassroots level.

Our recommendations include:

The restoration or rehabilitation of fish habitat should be aimed at through proper assessment of the negative impacts of previous misuse, and enforcement and implementation of the National Water Policy and the Fisheries Policy.

Wetlands should be reserved for fisheries and prevented from farmland encroachment through drainage. Perennial links of flood plain water bodies with rivers are to be resuscitated.

Rice Farming vs. Shrimp Farming: Land and Water Use Conflicts

Unplanned shrimp aquaculture development in the coastal areas of southwestern Bangladesh and the Cox’s Bazar district in the southeast has caused serious social conflict, damaged local livelihoods and agriculture, and raised crucial issues of land and water use. The resolution of such problems, especially those affecting rice farmers vis-à-vis shrimp farmers, is a joint task for the industry, fisheries and water sectors as well as the private sector enterprises. At the same time, the valuable contribution made by shrimp production to Bangladesh’s export earnings must be acknowledged, and there is little likelihood of rolling back the development that has taken place. Instead, the emphasis should be on reducing its adverse social and environmental impacts and carefully monitoring future potential conflicts.

As noted above, shrimp and prawn cultivation takes place mainly in the southwestern coastal districts (Satkhira, Khulna and Bagerhat), and in the Cox’s Bazar district of southeastern Bangladesh. Dry season production of local species of shrimp and fish, grown from naturally stocked fry and fingerlings carried into the ‘ghers’ (large shallow ponds in which shrimp and fish are grown) by controlled tidal inflow, is a long tradition in the coastal regions of Bangladesh. Under this system, the only significant input was labor, and the shrimp and fish yields per hectare were very low. Production was largely in

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the hands of the local farmers, who grew rice on the same land; hence, conflict between shrimp farmers and rice growers was minimal.

A major change to the situation occurred in the 1970s, with the spread of commercial farming of shrimp by entrepreneurs, many from outside the coastal region. These producers rented land from the local farmers for each dry season, usually on relatively short (typically, one to three year) leases, and stocked their *ghers* with purchased wild shrimp fry. Most production was on a low input-low output basis, though considerably more intensive than the preceding traditional system.

Shrimp production is still largely in the hands of commercial operators who lease land from local farmers. The latter, however, are becoming increasingly involved in shrimp cultivation themselves. Tensions exist between the commercial operators and the local rice farmers (from whom the former has rented *ghers*) because of the coercion used in many cases, leading to widespread conflicts. This is particularly the case where the affluent shrimp farmers are absentee outsiders and live away from their farms.

In the southwest shrimp-growing region, the ideal scenario is based on a shrimp-rice rotation, with shrimp grown in the dry season and the landowners, from whom the shrimp farmers lease their land, growing aman (monsoon) rice in the wet season. Since most shrimp farming takes place inside polders, rice farming normally should not suffer from saline flooding, although fresh water flooding resulting from drainage congestion does become a problem. Shrimp stocking usually takes place around February – after the completion of the aman rice harvest in December. In the December-February period, the *ghers* are filled with brackish water taken in at high tides. Salinity in the local river systems also increases in the December to May-June period due to decreasing fresh water discharge from upstream sources.

In order to enable the rice farmers to transplant their aman crop by late July or early August, the *ghers* should be drained, which implies that the shrimps should be harvested by the first half of July at the latest. However, the shrimp farmers tend to retain water in the *ghers* for as long as possible in order to maximize shrimp yields. Often, the shrimp

farmers are powerful enough to prevent the rice farmers getting their way, and hence, the draining of the *ghers* may take place too late to allow adequate time for the necessary leaching out of the salts from the salinised soil to a level which would allow aman planting. Consequently, transplanting is delayed and aman yields are reduced. This is the basic conflict between the two parties using the land, caused by the unavoidably conflicting requirements of the two “crops”, viz., shrimp and rice.

Prior to the construction of coastal polders (enclosed embankment), the natural and indigenous system of shrimp cultivation was practiced in small *ghers*. Ideally, saline water (which was stored in *ghers* behind wooden sluice gates) would be flushed out and replenished with monsoon rainfall and fresh water flows after the shrimp harvest, so that an aman rice crop could be grown. But, in reality, such is not the case. The scale of shrimp farming has changed from the previous indigenous practices. The industry is now characterized by greater intensification.

Practices such as the stocking of fry, feeding of shrimp and liming of the ponds have been introduced. The construction of coastal polders, originally designed to “keep out” saline water, have actually been deployed to “retain” salt water in the *ghers*. More importantly, the scale and extent of the land area leased out to shrimp cultivators has significantly increased in recent years, leading to a lopsided struggle between the powerful shrimp growers and the local small farmers.

Two main types of shrimp are produced commercially in Bangladesh: the Tiger Shrimp, (locally known as *bagda*) grown under saline conditions and the Giant Prawn (locally known as *golda*), grown under fresh or near-fresh water conditions. In terms of output, the Tiger Shrimp is the more important of the two types, and has a greater export demand; average annual production of Tiger Shrimp is around 26,000 tons compared to some 8500 tons of Giant Prawn. Tiger Shrimp’s area of cultivation is also 10 times greater than that of the Giant Prawn.

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Shrimp from Bangladesh accounts for some three percent of the world's shrimp exports, with about 30 percent going to the U.S.A., 20 percent to Japan, and 50 percent to the European Union (WRPO, 2000). During the 1990s the Tiger Shrimp cultivation expanded very rapidly, with farm area progressively encroaching on rice producing lands. The process has now somewhat slowed down, and social and environmental problems with the industry have generated pressures for more control over its operations, especially through the type of land use zoning envisaged in the National Water Policy.

Rice farmers and shrimp producers have been in perpetual conflict since the unregulated expansion of the shrimp industry in the 1980s. Serious disputes have often tended to arise when shrimp farmers deliberately implant a pipe into an embankment and allow saline water into a field, causing overspill and inundation of standing crops. Empirical studies under the Khulna-Jessore Drainage Rehabilitation project (in the waterlogged Khulna-Jessore area) have reported (BWDB, 1995) that social tensions between groups are exacerbated because polarized power relations. The large shrimp producers (who are also influential in the social hierarchy) tend to cultivate Tiger Shrimp, while small farmers concentrate on Giant Prawn (which require fresh water), often grown in rotation with *boro* (winter rice) crop. Because they have less clout, small farmers growing rice or Giant Prawn/*boro* rice combinations have little recourse against the man-induced inundation of saline farmers (The Tiger Shrimp producers). As the shrimp areas expand, the rice farmers are feeling even more vulnerable.

It is unlikely that the conflicts between rice and shrimp farmers will be resolved in the near future. Rice production is becoming increasingly difficult as more and more land is devoted to shrimp, and producers, in order to get maximum profit, tend not to release the land on time to rice farmers. Current management practices do not allow rice farmers to gain access to the land at the right time to produce seedling beds of their own. Consequently, they are forced to import seedlings from outside the area at a higher cost. Soil salinity is also increasing due to prolonged water logging, and as a result, rice yields are diminishing. It has been sometimes argued by experts that Tiger Shrimp farming can

become compatible with rice farming on the same land through coordinated management practices. But, in reality, this has not been found to be the case.

Giant Prawn production might provide a viable alternative to the current conflict situation between rice and shrimp farmers. Unlike Tiger Shrimp, there are no major physical, social or environmental constraints on its expansion. There is also no inherent conflict between the two types of production (rice and shrimp) on the same land. This is because Giant Prawn is a fresh water rather than brackish water production system, and small farmers can adopt its production through integrating it with existing rice (irrigated *boro*) cultivation. Giant Prawn growers, who are generally small holders, grow *boro* rice (using irrigation) in their *ghers* only after harvesting the prawns. They are, however, dependent on fresh water (pumped from shallow tube wells or low-lift pumps) for the cultivation of the winter (dry season) rice.

Giant Prawn cultivation is gradually becoming popular, since this cash crop can be grown on the same plot of land with rice, but without adverse effects on the water table or the water quality. Although exports of Tiger Shrimp are much more than those of Giant Prawn, Bangladesh has recently developed and expanded its export market of Giant Prawn as well (WRPO, 2000), and exporters do not anticipate major problems in finding markets for increased Giant Prawn output. Market prospects for Tiger Shrimp and Giant Prawn exports appear satisfactory, provided hygiene standards are maintained.

Conflicts between rice farming and shrimp farming will not go away easily, primarily due to two reasons: unequal power and economic status of the shrimp growers and small rice farmers; and the construction of *ghers* by shrimp growers which increase soil salinity (detrimental to rice production) and prevent drainage. Local level water management mechanisms supported by planned zoning for shrimp cultivation might be the long term answer to this increasingly complex conflict scenario in land and water use between rice growers and shrimp producers.

Our principal recommendation is:

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Giant Prawn production, which can grow in fresh water, should be emphasized in coastal aquaculture planning, so that farmlands along the coast are not destroyed through incursion of saline water for Tiger Shrimp farming.

D. CASE STUDY OF A CONFLICT IN VALUING WATER in NEPAL

A Typical Development Dispute in Chitwan

In this section, we would like to start with a tale of transition, both social and environmental, at the boundary of the Royal Chitwan National Park in central-south Nepal. It is a story that describes a water use conflict between two resource-managing community groups and indicates that water security, which overrides water economics, can be as crucial an issue at the local level as at the regional and international. Even though water conflict narratives between nation-states tend to get more press coverage, this case also highlights how alternative (and environmentally friendly) water use can be economically at least as valuable as conventional irrigation, and communities can fight to maintain the benefit accruing to them.

Both the Khageri irrigation project and the Baghmara community forest are adjacent to the Royal Chitwan National Park in the Chitwan valley, which is an east-west elongated *doon* valley between the Siwaliks in the south and the Mahabharat range to the north. The East Rapti, which is a non-snow fed river that originates from the southern slopes of the Mahabharat range south-west of Kathmandu valley, bisects the valley as it flows east to west. The river picks up smaller tributaries on both banks such as the Lothar, the Manahari and the Khageri before finally meeting the Gandak in Nepal, just before the latter debouches through the Siwaliks at Bhainsalotan into India forming the Bihar-Uttar Pradesh border. Much of this area was a jungle until the middle of the 20th century, but in the early 1960s, a malaria eradication program was successfully carried out, which opened up the valley for resettlement.

Khageri Irrigation Project

The Khageri is a small river that flows from the Mahabharat hills in the north to meet the Budhi Rapti, the old channel of the Rapti. The irrigation project consists of a weir at the point where Nepal's national east-west highway crosses the river. The details are shown in **Figure 8**.

Its foundation was laid in 1959, and by July 1967, its canal started supplying water. The total cost of the project then was Rs 74 lakhs (a lakh equals 100,000), all in Nepali currency, with no involvement of any foreign aid initially. Its total irrigation command is 3,900 ha. In a normal year, the reliable irrigation area is 2800-2900 ha, but in dry years such as 1969, 1976 and 1992, irrigation has been provided to less than 2000 ha. In the monsoon season of 2000, irrigation was provided to 3500 ha and in 2001, the entire command of 3900 ha because rainfall was exceptionally good in these two years.

In an attempt to reduce people-park conflicts, people from within the national park area on the left bank villages of the Rapti such as Padampur were resettled to the north in Saguntole, which is an area that lies in the upper catchment of the Khageri at the foot of the hills from where the river emerges into the Chitwan valley. These settlers have now begun abstracting water that used to flow in the Khageri and was used for irrigation by the farmers downstream. The new settlers have also begun to deforest the area and build check dams to check landslides and the consequent flashfloods. However, this interferes with the natural regime of the river system and channels the waters that previously used to flow through the jungle in a more spread-out fashion. This means that the Khageri waters reach the irrigation barrage in a more violent form during the monsoon, with the danger of damaging or washing it away.

In order to protect the Khageri irrigation system and the investments made by the people and the Government of Nepal, the managers of the community-owned irrigation system

propose to construct a pump scheme at the point where the Khageri meets the Budhi Rapti. This arrangement would not only compensate the downstream users for the water withdrawn by the new settlers or oustees from the National Park, but would also provide the additional water required to expand the irrigated area of the Khageri command by an additional 1000 ha. (Tika Ram Dahal, 1999). It is claimed that mostly poor people live in this area.

While there were 3400 households in the old command area of 3900 ha, this additional 1000 ha area has 1500 households, obviously with poorer people having far smaller landholdings. Consultants from the Asian Development Bank – which funded the Padampur resettlement and have been involved in Chitwan valley's irrigation as well – initially estimated the total cost of the pump scheme at Rs 14 crores (one crore = 100 lakhs = 10 million), but there is a feeling among the Khageri system managers and others that this can come down to 10 crores with a frill-free design.

While this scheme would augment the flow in the Khageri system and provide irrigation benefits to the people of the Khageri command, it has severe environmental and economic consequences that need to be addressed. The Khageri diversion weir and its primary irrigation command in Devinagar area are separated by the Barandabhar wildlife corridor that connects the National Park with the forests to the north. The Khageri main canal bisects this crucial forest corridor, whose conservation is vital to maintain a viable population of endangered wildlife. The proponents of the irrigation expansion argue that more pumped water in the Khageri main canal would be environmentally beneficial, as it would provide reliable supplemental water to the Bees Hazari Taal, a wetland area within the Barandabhar corridor. However, there are other consequences, both environmental and economic, to pumping water from the Budhi Rapti that will be discussed below (Dahal, 1999).

Baghmara Community Forestry

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The Royal Chitwan National Park with its *sal* and riverine forests and grassland ecology was established in 1973 (it had been a protected Royal Hunting Reserve since 1965) and was declared a World Heritage Site in 1983. Its 932 km² area has 570 species of flowering plants, 40 of mammals, 486 of birds, 17 of reptiles and 68 of fish, including the endangered tiger, rhino, gaur, wild elephant, striped hyena, sloth bear and the Gangetic dolphin (Resources Nepal, 1999).

Realizing that nature protection required the support of the surrounding community that depends upon the forest resources, the King Mahendra Trust for Nature Conservation felt the need for a buffer zone program. Under this approach, the land surrounding the core conservation area is earmarked for a community forest managed by the villagers themselves, that addresses the fodder and fuel wood needs of the people in the perimeter of the national park. In 1989, the pilot Baghmara community forestry project was launched, and similar activities were initiated subsequently in eleven other sites. By 2000 AD, more than 3000ha of highly degraded land surrounding the national park had been revived as community forests, which now support not only forest cover but also a rich variety of wildlife.

Even in the small Baghmara community forest, 16 species of wild animals and over 162 species of birds have so far been recorded by KMTNC monitoring team. The animals include the rhinoceros, tiger, three species of deers, marsh mugger crocodiles, leopard, jackal, small Indian civet, wild boar, python, five striped squirrel, Indian fox, yellow throated martin, golden monitor lizard and jungle cat. The Chitrasen community forest on the opposite bank of the Budhi Rapti from Baghmara has recorded the grey fox in addition to the over 159 species of birds and all the animals that are found in Baghmara (KMTNC, 1999).

The result of this growth in wildlife was an economic disaster for the surrounding farmers, but it has today been converted into a blessing. The wild herbivores made farming difficult, as they would devour the crops planted by farmers. Because these

animals belonged to the national park and were protected, they could not be killed or injured. Over time, the villagers realized that they could earn a lot more money from tourists coming in to see the wildlife than from the crops they could raise. They then began operating their own elephant rides and built lodges and observation *machaans* from where wildlife could be observed, thus earning money from tourism.

The most lucrative eco-tourism activity for the Baghmara/Chitrasen community forestry groups has been the dugout canoe boat ride on the Budhi Rapti. Because both banks of the river have been restored to riverine forest conditions with the success of community forestry in Baghmara and Chitrasen, wildlife has returned. So a roughly forty-five minute gentle punting downstream from the point where the river is met by the Khageri up to its confluence with the East Rapti allows the visitors excellent bird watching as well as a chance to see the rare marsh mugger crocodiles in their natural habitat conditions. The trip ends at the elephant-breeding center, which is another major tourist attraction, and the canoe ride is the easiest and most pleasant way to get there.

Run by the communities that manage the forest, each tourist is charged Rs 200 (about US\$\$), of which the Baghmara takes 55%, and 45% is taken by the Chitrasen Community Forest user groups. The total revenue generated so far from the boat rides is Rs 99,57,550 with the income for fiscal year 2000-2001 being Rs 39,04,000 and for 1999-2000 being Rs 36,61,600. Some thirty thousand tourists of various nationalities visited Baghmara in 2000.

Conflict and Resolution

If the Khageri farmers pumped the waters of the river after its confluence with the Budhi Rapti, it would dry out the river below, and the Baghmara forest users would have to close their lucrative canoe rides. In direct economic terms, it would mean a loss of about 4 million rupees per annum for them. Indirectly, there would be further impact on wildlife habitat, and loss of tourist trade. The Khageri farmers also have a strong case: they argue that the loss of their water is due to the National Park resettling people from within the park boundary in the upper catchment of their stream source. Hence they are now the new victims who need to be compensated with the proposed pump scheme. They also argue that an area of 1000 ha brought under additional two or three-crop irrigation would provide economic benefits several times more than from boat rides. However, when asked if they would then be willing to compensate the Baghmara people four million rupees per annum from their increased earnings, they seem less enthusiastic (Dahal, 1999).

In analyzing this conundrum, one clearly sees three proclivities at work: that of the profit-inclined market (farmers, boat rides), that of egalitarian conservation efforts (preserving the habitats), and that of a regulatory solidarity that can adjudicate between the conflicting claims (the government mechanism). How a balance is struck will really depend upon the perception of fairness regarding the regulatory body, the space for dialogue between contending claims, and the innovative ways of transcending the impasse that it can bring forth from the discourse. If the government mechanism is seen as leaning too heavily on the side of the profit makers, conflict and impasse is inevitable. If it were able to bring forth a solution that fully pleases no one but partially is something no one can ignore, an impasse may be avoided and a "circle of improvement"ⁱⁱⁱ may be initiated.

While it is difficult to predict which way the discourse will take, a possible solution that would not drive any of the solidarities off the map could be if there was, for example, a bit of "conservation plus development" activism in this matter. If some water has to given

to the Khageri irrigation system, it is environmentally less damaging to pump water from the main Rapti just after its confluence with Budhi Rapti than from the Budhi Rapti itself. The canal would be slightly longer, but then this variant could also serve the Elephant Breeding Center with water supply and wallowing pond.

The role of the adjudicator would be to make sure that development is not neglected, but any development embarked upon must also be conducive to the long-term goal of wildlife corridor maintenance. For this, it must make sure that no more water is pumped from the East Rapti (which is a much bigger river) than would be available if the pumping were done from Budhi Rapti itself. In such a case, the canoe rides could continue in a preserved habitat, the market forces could continue their profit making irrigated agriculture, and public confidence would not be lost in the adjudication mechanism.

Valuing Water

The purpose of the above story, repeated across the Indo-Gangatic plains, is to highlight the fact that, although one cannot have good politics without good economics, water economics – because of the multifaceted nature of water and its crucial role in all forms of life-sustaining processes – will always be subservient to water politics. A transparent pricing of water is possible where there is a genuine overground economy with a fair and just adjudicator: it is not possible where the economy is informal and the regulatory bureaucracy essentially rent-seeking. Several issues of valuation comes up for consideration and a possible research agenda, when one looks at water within the broader social context:

There is a difference in valuing water and valuing the service of delivering water. The former is difficult because of multiple reasons, the most crucial of which are the different properties of water that is put to different uses. Some of them are of such symbolic importance that attempting to place a price on them would be considered sacrilegious. For example, water at a religious site would be considered holy (bathing ghats near

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temples) and would require certain properties of flow to be maintained. It cannot be substituted by tanker-supplied water. The latter is easier to measure, allocate and hence price to the satisfaction of all. Therefore the debate over water tariff would be quite different if it was seen as price hike of water on the one hand, and on the other, admitting that water is a "human rights" subject of egalitarian concern, but that the delivery of water has a cost associated with it that needs to be met.

The context of the market – whether it is genuine or a phantom – will determine the reactions to market pricing of water. The poor have many skills and other intangible assets that they could bring to the market. Unfortunately, much of it is in the informal sector (including much of their labor) that is not officially recognized and hence not formally priced. In a trading regime, they would be at a tremendous disadvantage because what is in the cash economy is only a small portion of what they "own" and which is needed for many other trading needs.

Maintenance of water systems (whether drinking water or irrigation) often demands some degree of voluntary contribution. Governments never have enough money for everything, anyway, and would find it difficult to allocate for the running costs once construction of new development is over. In such a case, the question of ownership, as well as the sense of ownership, is important. It allows for reasonable price increase as well as voluntary service where rewards are in the form of social recognition.

Integrated management, like sustainable development, is an attractive concept with serious unanswered questions. The most important one is: who does the integrating? The obvious one, from the past alliance of foreign aid and national bureaucracy, is one more bureaucratic "authority" to do it. This has failed in the past, and there is no reason to suspect a future with more of the same will be any more successful. The answer from the free marketers is that the market will automatically do the integrating, hence the push for privatization of the water utilities in Southern countries by donor agencies of the North. However, the market's failure to "integrate" social and environmental concerns is too well known to re-iterate here. This Case Study makes a plea for a three-legged "contested

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terrain" integration, where a just hierarchy regulates an innovative market, but both are under constant "audit" by a genuinely voluntary civil society.

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