

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/267327690>

Natural Resources Security in South Asia: Nepal's Water

Book · January 2007

DOI: 10.13140/2.1.1.2200.5765

CITATION

1

READS

539

2 authors, including:



Ashok Swain

Uppsala University

136 PUBLICATIONS 1,727 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Sustainable Development Goals and Covid-19 impact [View project](#)

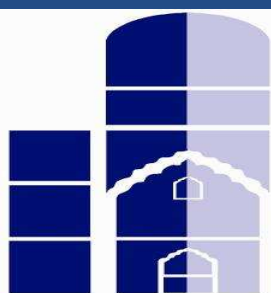


New and emerging security threats in the Middle East [View project](#)

Natural Resources Security in South Asia: Nepal's Water

Fiona Rotberg
Ashok Swain
Editors

October 2007



*Institute for Security
& Development Policy*

Natural Resources Security
In South Asia:
Nepal's Water

Fiona Rotberg and Ashok Swain
Editors

"Natural Resources Security in South Asia: Nepal's Water" is a monograph published by the Institute for Security and Development Policy in the *Asia Paper* series. The *Asia Paper* series is the Occasional Paper series of the Institute's Asia Program, published jointly on topical and timely subjects. The Institute is based in Stockholm, Sweden, and cooperates closely with research centers in Europe and Asia. Through its Silk Road Studies Program, the Institute runs a joint Transatlantic Research and Policy Center with the Central Asia-Caucasus Institute of Johns Hopkins University's School of Advanced International Studies. The Institute is firmly established as a leading research and policy center, serving a large and diverse community of analysts, scholars, policy-watchers, business leaders and journalists. It aims to be at the forefront of research on issues of conflict, security, and development in the region. Through its applied research, publications, research cooperation, public lectures and seminars, it aspires to function as a focal point for academic, policy, and public discussion regarding the region.

© Institute for Security and Development Policy, 2007

ISBN: 978-91-85937-02-8

Printed in Singapore

Distributed in Europe by:

Institute for Security and Development Policy
Västra Finnbodavägen 2, 131 30 Stockholm-Nacka, Sweden
Email: info@silkroadstudies.org

Distributed in North America by:

The Central Asia-Caucasus Institute
Paul H. Nitze School of Advanced International Studies
1619 Massachusetts Ave. NW, Washington, D.C. 20036
Tel. +1-202-663-7723; Fax. +1-202-663-7785
E-mail: caciz@jhudig.admin.jhu.edu

Editorial correspondence should be addressed to Dr. Niklas Swanström, Director, at either of the addresses above (preferably by e-mail).

Sponsor of this publication



The Swedish Foreign Ministry

Table of Contents

Map of Nepal.....	6
Introduction	7
Acknowledgements.....	13
I. Changing Political Context, New Power Relations and Hydro-Conflict in Nepal	15
<i>Bishnu Raj Upreti</i>	
II. Water Security and Farmer Managed Irrigation Systems of Nepal	67
<i>Ashok Raj Regmi</i>	
III. Coping with Policy, Institutions, and Governance Challenges of Water Resources Issues with Special Reference to Irrigation in Nepal.....	III
<i>Ganesh P. Shivakoti</i>	
IV. The Mahakali River Treaty: Applying a New Lens to Past Efforts for Future Success.....	141
<i>Glen Hearn</i>	
Participating Authors.....	171

Map of Nepal



Source: Central Intelligence Agency, 2006.

Introduction

Fiona J.Y. Rotberg ¹ and Ashok Swain ²

Nepal, a small country land locked between China and India, boasts of diverse topological regions and approximately 6,000 rivers and rivulets flowing through it. Nepal's 23 million people depend heavily on agriculture and tourism for their livelihood; approximately 90% of the population relies on subsistence agriculture.

Nepal has recently emerged from a bitter decade long civil war, between the Government of Nepal and the Communist Party of Nepal – Maoists, CPNM (Maoists) in which 13,000 citizens were killed. Thus, today, Nepal is in the midst of historical change and political peace process. The agreement on November 21, 2006 has formally ended the war and brought the Maoist insurgents closer to achieving their goal of a republic. A transitional government, which includes former Maoist fighters, was established in the spring of 2007. Constituent assembly elections are set for November 2007, after being postponed in June 2007.

Despite this progressive march towards democracy, there is still a culture of violence in Nepal, and incidents of small scale deadly disturbance have occurred on a regular basis since the transitional government was formed. These incidents are each unique on the surface, yet their root causes often remain the same as those that contributed to the start of the Maoist insurgency, and now help contribute to the present insecure environment.

¹ Dr. Fiona J.Y. Rotberg, Research Fellow, Institute for Security and Development Policy Stockholm, Sweden. Email: frotberg@silkroadstudies.org

² Dr. Ashok Swain, Professor of Peace and Conflict Research, Uppsala University, Sweden Email: ashok.swain@pcr.uu.se

For example, rivalries between caste and ethnic groups threaten the peace process. New ethnically based groups, (mostly Maoist splinter groups) are protesting against long engrained discrimination. Embedded in their demands include issues that involve unequal access to, and distribution of, natural resources, including land and water. Strong state institutional capability is lacking in Nepal, which further exacerbates proper governance and management of natural resources.

The complex security issues facing Nepal today invariably involve India and other neighboring states. Discussions at the local and national levels of how to address access and governance of water, for example, must include stakeholders across Nepal's borders.

Generally, India and Nepal have relatively good bilateral relations. Both countries have had many rounds of occasional tense negotiations relating to hydroelectricity generation, irrigation water, and flood control. Several early agreements about shared projects have been controversial in Nepal. The water sharing of the major rivers originating in Nepal and flowing into India has strained the relationship between the two countries. Nepalese feel that they have not been treated equitably under the various water-resource development agreements with India, including Sarada, Kosi and Gandak. Negotiations regarding projects on the shared river systems have been dominated by controversies due to a lack of mutual trust.

The recent serious dispute over the river water issue came up in the early 1990s. In December 1991, both countries signed a Memorandum of Understanding (MOU) to construct a barrage at Tanakpur, for which Nepal agreed to provide 2.9 hectares of land. Nepalese rivers have tremendous potential for hydropower generation. However, this issue became extremely controversial in Nepal due to the internal political situation, which created bilateral tension. After several rounds of negotiations, the Prime Ministers of India and Nepal signed the Mahakali Treaty in February 1996. This treaty on the integrated development of the Mahakali River came up as a solution to the legacy of disagreement between Nepal and India over the Tanakpur Barrage project. The Treaty, by enlarging its scope, brought three separate water-resource projects under its ambit. In

addition to validating the Tanakpur MOU, the agreement took under its wing the regime established by the Sarada Treaty, and also paved the way for the construction of the Pancheshwar Multipurpose project. However, Nepal lacks the capital and technology required for such large projects and also needs a buyer for the surplus hydropower. Due to various factors, India is the only country that could provide assistance. Thus, India's direct involvement in the utilization of the river water in Nepal is crucial and that contributes to regular controversies.

Most of the international river water agreements in South Asia are not comprehensive in nature. Despite huge water resources available in the region, the inability among and between countries of the region to reach mutually beneficial comprehensive agreements could invite more conflicts in the days ahead. The way in which rivers are used in one country can indeed have far-reaching effects on nations downstream. India's proposal to link major rivers in the region to provide water to its arid provinces is causing anxiety among its neighbors, particularly Bangladesh and Nepal. The project plans to connect 30 major rivers and would involve diverting the Ganges and the Brahmaputra. This massive proposal, if it gets implemented, requires the construction of large dams within India, Nepal and Bhutan. The linking of major rivers of the region could create more disputes instead of resolving the existing ones.

Since its failed military involvement in the ethnic conflict in Sri Lanka in the 1980s, India was reluctant to play an active role in mediating conflict in its Nepal. However, the political situation in Nepal in 2006 has forced India to take the Nepal situation seriously. The on-going political development in Nepal has marginalized the King and has created many powerful political actors and the issue has become an international one. India is also seriously worried about trans-border cooperation between Radical Left groups as eastern part of India is increasingly experiencing serious security threats from the Ultra Marxists.

India's relations with Bhutan are much smoother, in comparison to its relationship with Nepal. This is reflected in several hydropower development agreements signed by the two countries. A few notable ones are the Kurichhu Hydro-Electric Project on Kurichhu River and the Chukha Hydroelectric

project on Wangchu River. In the 1990s, India and Bhutan agreed to construct Tala Hydro-electric Project, a run-of-the-river 1020 MW project on the Wangchu River, downstream of Chukha Hydroelectric project. This project is being funded by India as in previous cases, but most importantly it establishes a process for sharing the benefits of development, this time through market prices rather than a fixed rate of payment. One central part of the deal, the price Bhutan receives for electricity generated, was not pre-determined, but left for the market to decide. This principle may be adopted in future Indo-Nepal water sharing agreements.

It is within this complex context that the Central Asia-Caucasus Institute and Silk Road Studies Program at the Eurasian Studies Department, in junction with the Department of Peace and Conflict Research, at Uppsala University, organized *The Nepal Water Security Forum*, an academic forum for policy making in the South Asian region. The objective of the *Forum* was to share knowledge and expertise on water security issues in Nepal and the region, and to work towards relevant policy recommendations to address these issues.

The *Forum* was organized around four working sessions. The introductory remarks addressed the changing political situation in Nepal and the road to a democratic and peaceful solution to the decade old conflict, and how these issues intersect with water security issues not only in Nepal, but in the South Asian region.

The first session focused on the changes and opportunities for addressing water security and water conflict in the current Nepalese political context, with a particular focus on hydrological conflicts.

The second session addressed legal and institutional challenges of sharing water resources across Nepal's borders. In this session, strategies for regime building and institutional cooperation were analyzed, as well as addressing policy and governance challenges of water irrigation issues that cross borders.

The third session addressed the intersection of water security, resource scarcity and conflict and cooperation, with a special emphasis on farmer managed irrigation systems.

The last session served as a prescriptive policy discussion around regional water security issues. The main prescription of the group was that an international initiative was needed to enhance water and energy security in Nepal and the region. To this end, the group agreed that an international initiative – such as an inter university think tank that promoted private sector partnerships – must at least include the following criteria:

- 1) Support the ongoing peace building process;
- 2) Address the most basic water needs;
- 3) Reduce politicization/polarization of water issues;
- 4) Build on past and present knowledge and activities;
- 5) Focus on institutional development;
- 6) Enhance local capacity;
- 7) Increase the possibility of sustainability of activities; and,
- 8) Be a cooperative interchange.

The distinguished academics and practitioners who presented during the day were: Mr. Ajaya Dixit, Mr. Glen Hearn, Dr. Richard Matthew, Dr. Ashok Regmi, Dr. Ganesh Shivakoti, and Dr. Bishnu Raj Upreti.

The following sections of this edited volume provide the reader with the opportunity to read the presented papers that adeptly address the complex local, national, and international water security issues that face the region today and that were discussed throughout the day at the *Nepal Water Security Forum*.

Section One presents Dr. Upreti's paper entitled: *Changing Political context, New Power Relations and Hydro-conflict in Nepal*. This paper provides a thorough overview of the present and potential areas of water conflict in Nepal and the South Asian region.

Section Two views the role of water security in the region through the lenses of local Farmer Managed Irrigation Systems (FMIS). Dr. Regmi's paper; *Water Security and Farmer Managed Irrigation Systems of Nepal* suggests that local farmer groups can indeed successfully self organize to govern natural resources, such as water.

Similarly addressing local and national irrigation schemes, in **Section Three**, Dr. Shivakoti warns in his paper; *Coping with Policy, Institutions and Governance Challenges of Water Resources Issues with Special Reference to Irrigation in Nepal*, that effective governance of irrigation systems must also account for emerging global challenges such as watershed degradation.

Section Four focuses on the need for international cooperation to address the management of water resources in South Asia. Mr. Hearn's paper, *The Mahakali River Treaty: Applying a New Lens to Past Efforts for Future Success*, gives us an in depth look at the Mahakali River Treaty as an international cooperative example.

Acknowledgements

The *Nepal Water Security Forum* was made possible by Riksbanken of Sweden and the Swedish Network of Peace, Conflict and Development Research. The success of the *Forum* was due to the participation of the panel members; the hard work of Johan Alvin, the Nepal Project Coordinator, and the attendees throughout the day.

I. Changing Political Context, New Power Relations and Hydro-Conflict in Nepal ¹

Bishnu Raj Upreti ²

The Changing Political Context

The ‘people’s war’ waged by the Communist Party of Nepal (Maoist) (February 1996-April 2006) and the people’s movement of April 6-24, 2006 not only seriously questioned the relevance of the nearly 400 year-old royal dynasty, but it also paved the way for a fundamental socio-political transformation of the country. The April movement was a collective effort of the Nepalese people to end the 10-year old armed insurgency and to restore peace and democracy; in so doing overthrowing the autocratic rule of the king and leading the way to the abolishment of a centuries-old feudalistic, centralized and exclusionary system. The April movement was a response to the February 1st, 2005 royal takeover and the arrogance of the king and his rule of the country by use of military power, suppressing media, civil society, politicians, and the voice of citizens, ignoring human rights and consistently denying international pleas to respect human rights and democratic values. Further, it was also a response to the Maoist insurgency and the failure of the mainstream political parties to govern the country.

Since April 2006 (when the king was forced to surrender and declare a ceasefire and enter into a peaceful negotiation process with the new government), feudalistic, centralized and exclusionary state structures – so designed to

¹ Paper presented at the Nepal Water Security Forum organised by The Silk Road Studies Program, Uppsala University, Sweden, at Hotel Radisson, Uppsala on March 27, 2007. This work is co-sponsored by The Silk Road Studies Program and NCCR North-South. However, the author is responsible for the content of the paper, which does not necessarily reflect the opinion of the co-sponsors.

² Regional Coordinator, Swiss National Centre of Competence in Research (NCCR) North-South, South Asia Coordination Office, GPO Box 910, Kathmandu, Nepal, Tel. 977-1-5554756, Fax: 977-1-5547756, e-mail: bupreti@nccr.wlink.com.np

strengthen the supremacy of the monarchy – are fast being dismantled. Consequently, Nepal is at the crossroads of a fundamental socio-political transformation and so a new beginning. Facilitating and sustaining such transformation requires a new vision, a new constitutional framework, new institutional arrangements, new instruments and new commitment. The conduct, action and behavior of the fundamental institutions, such as the political parties, judiciary, security and bureaucracy, will determine the success or failure of transformation.

The water resource sub-sector is one of the major areas where a change in governing system, legal arrangements, bureaucratic reorientation and institutional reframing is essential in order to address the associated growing scarcity and conflict. This paper discusses the dynamics of hydro-conflict in the changing political context and outlines the conditions and ways to address it in the 'new' Nepal.³

The king used the ongoing armed insurgency as a reason for his takeover (expecting that he would get support from the international community under the banner of the 'war on terror') and as a means for consolidating autocratic rule. He had suspended peoples' rights and brutally suppressed political parties, which had in fact acted as a buffer between the king and the Maoists. As a result, the mainstream political parties had no option left other than to collaborate with the Maoists and collectively fight against the king. However, they were so unpopular at that time that people were not even prepared to show up in the mass meetings organized by them. Civil society was powerful and trusted by the general public and therefore civil society leaders organized a series of mass meetings and invited political leaders as either co-speakers or audiences. Civil society often organized huge mass meetings to protest against the royal takeover where senior leaders of all political leaders attended as audience members. Civil society leaders had consistently forced them to

³ "New Nepal" is the phrase frequently used in Nepal after the successful April movement mainly to reflect the expectation of people in terms of changes in the state's governing structures (e.g., federal governing system), process (meaningful participation of people in decision making of governing system) and outcomes (ensuring access of poor, marginalized and excluded people in economic, political and social security).

collaborate with the Maoists to overthrow the king. Finally, it was the strong pressure from civil society, the facilitation of Indian political leaders and the realization of their weaknesses in the past and assessing the action and behavior of the king, that brought the main seven parties together to form an alliance (popularly called the Seven Party Alliance = SPA) and to collaborate with the Maoists. Consequently, the SPA and the Maoists reached a 12 point understanding (see Annex 1) to fight against the autocratic rule of the king. This all finally resulted in the political change of April 2006.

Since the political change of April 2006, the existing dominant power relations in the country have been altered and the palace, as the 'nucleus' of power relations, has changed now that the role of the king is completely suspended. After the signing of the comprehensive Peace Agreement between the government of SPA and the Communist Party of Nepal (Maoist) on November 21, 2006 (see Annex 2 for details), the Maoists emerged as one of the main power centers in the politics of Nepal. Consequently, the actions and behavior of key players in Nepal's politics are now influenced and shaped by the changing power relations of the country. This has also been amply reflected in the water politics of Nepal. Now that the king has been suspended from the political process, people who enjoyed the protection and support of the king, and who were previously active in politics, now find themselves out of mainstream politics and consequently not able to directly use state power and resources for their benefit in exploiting water resources (for example granting licenses, selecting particular companies for the construction, etc.).

Together with the changing political context, new institutional and legal provisions are emerging. The Comprehensive Peace Agreement (CPA) signed by the Government of Nepal and the CPN (M) on November 21, 2006 has made some vague forward-moving proposals that relate to natural resources, including water. Article 3.1 of Section 3 'Political, social, economic transformation and conflict management' of the CPA states: "Adopt policies for protection and promotion of national industries and resources". Similarly, article 3.1 also states: 'Prepare a common development concept that will help in the socio-economic transformation of the country and will also assist in ensuring the country's

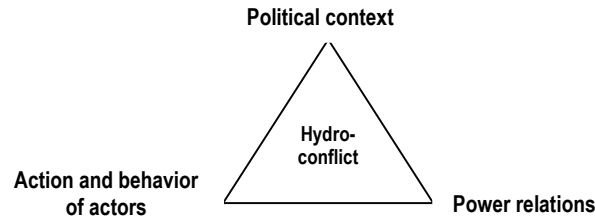
economic prosperity in a short period of time'. These provisions are further reflected in the Interim Constitution, which will have some implications in future water resource-related policy. These implications would be more investment from domestic sectors in water resource development, national consensus in taking decision about mega hydro projects, etc. However, at present, all bio-physical, geopolitical and socio-economic aspects of water issues do not constitute the explicit priority of the new political actors; though they have vaguely voiced their opinions on how water resources should be developed in the new context Nepal finds itself in.

Conceptual Basis of Analysis

Though some scholars argue that water conflict is neither strategically rational, hydrologically effective nor economically viable,⁴ the argument of rationality, effectiveness and viability often do not shape politically vested interest-based behavior and the actions of major actors. Rather, special power relations shape the course of behavior and actions leading to conflict. As far as Nepal is concerned at least, Nepalese hydro-politics and related conflicts mainly derive from vested political interest-based behavior and the actions framed within the special power relations of main actors. Hence, the complexity of hydro-conflict cannot be reduced to the logic of strategic rationality, hydrological effectiveness, and economic viability; and, in so doing, ignoring the context of specific power relations and political dynamics.

The political system and subsystems of any nation not only frame policy, strategies and practices but also largely shape behavior and the actions of its citizens. Similarly, the behavior and actions of citizens influences national politics. Hence, the politics and behavior of citizens are interrelated and reflected in various forms of power relations. Nepal's hydro-conflict has to be examined from this conceptual framework.

⁴ Wolf, A. T. (2004), *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace*. Berlin: Adelphi Research.



Politics can also be a source of mistrust, suspicion, injustice, exclusion, marginalisation, discrimination and hate, as well as a means of harmony, unity, cooperation and collective action – these all determine the course of action in conflict (both in resolving and escalating it). Hence, like all other areas, politics is influential in shaping and reshaping the destiny of sustainable water resource management and resolving hydro-conflict and addressing water scarcity.⁵ Critical examination of the political negotiations and renegotiations between different political actors (at both national and regional levels) provides a better understanding of how highly contested issues such as hydro-conflict and water scarcity are dealt with at national and regional levels.

Water Conflict in Nepal: An Overview

Water conflict is not a new phenomenon in the world. The trans-boundary fresh water dispute database of Oregon State University has documented 1200 cases from 1948 to 1999.⁶ Several studies have amply demonstrated that water conflict and cooperation is an integral part of the social and political life of society.⁷ Environmental crises and hydro-conflict are major challenges of the 21st century. Nepal is no exception and is experiencing large numbers of hydro-conflicts influenced by vested interests, trade-offs, power relations, norms, values and perceptions.

⁵ Upreti, B. R. (2006), *Armed Conflict and Peace Process in Nepal: The Maoist Insurgency, Past Negotiation and Opportunities for Conflict Transformation*. New Delhi: Adroit Publishers.

⁶ Wolf, A. T. (2004), *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace*. Berlin: Adelphi Research.

⁷ See, Ohlsson, 1995; Panos Institute South Asia, 2004; Phillips, et al., 2006; Swain, 1996; Upreti, 1999; 2001 and 2002.

The growing population plus the factories and farms in Nepal all need more water and other natural resources. Therefore, competition between domestic consumption, industries and farms is increasing and turning into disputes. Water pollution is another strategic issue of conflict. We can see examples in Kathmandu Valley where all the river systems (Bagmati, Bishnumati and Manohara river systems) are in a state of near collapse because the river water is no longer useable. Conflict between the needs of populations living upstream of river basins and those dwelling downstream is mounting. Natural resources in Nepal are now becoming a highly sensitive political issue and a source of conflict. The Melamchi Megha Drinking Water Project is a prime example of such a conflict. Once the Melamchi Megha Drinking Water Project was started, local people affiliated with different political parties started to make several demands such as employment of local people and the development of infrastructure. As the project did not agree to fulfill all the demands of the local public, this led to tension and conflict between the project and the people. Consequently, they have had to temporarily close construction work on the site.

Different kinds of water-related conflicts have been reported in Nepal.⁸ Source disputes, the sharing of water for different purposes (for example, use for drinking water, irrigation, water turbines), and the payment of compensation for damage caused while constructing canals and laying drinking-water pipes have frequently been reported. Similarly, conflict over contributions to the maintenance of irrigation and drinking water systems, the ambiguous roles and responsibilities of watchmen and their payments, and disputes among water users' associations/committees on their roles and responsibilities were other common water-related conflicts frequently reported in Nepal. In addition, damage caused by the overflow of water from canals and conflict, due to the ambiguous roles of water technicians and officials, were also common occurrences. Earlier studies⁹ have shown that water conflict is a normal phenomenon – in the absence of a clear provision of water rights – if the same source is used for more than one purpose. The occurrence and intensity of such

⁸ Upreti, B. R. (2004), *The Price of Neglect: From Resource Conflict to the Maoist Insurgency in the Himalayan Kingdom*. Kathmandu, Brikuti Academic Publications.

⁹ See, Upreti, 2001; IMC, 1990; Pradhan et al., 1997.

a conflict is especially high when water becomes scarce in the dry season. Inequitable and unreliable water distribution and the excessive use of water in the head section limits the supply (in terms of time and quantity) in the tail section and often causes frequent conflict concerning the irrigation system. This is particularly serious when several irrigation systems operate upstream and downstream with limited water availability. The demand for irrigation water is increasing in the study area due to the introduction of improved varieties of rice, winter crops and changes in the cropping systems. The cropping intensity and cropping patterns are also changing together with technological innovations and the process of globalization. In periods of water scarcity, the frequency as well as the intensity of conflict is high. It was also noticed that conflict resolution over the two irrigation systems was easy if the same farmer is also a user (having land in the command areas of these canals) of both irrigation systems. It is reported that the frequency and intensity of conflict is greater in joint managed irrigation systems than in ones fully managed by farmers.¹⁰ The main cause of conflict in such systems was an unreliable water supply to tail-end farmers during the winter and spring crop seasons, due to an inability to implement proper water scheduling.¹¹

Some studies have shown that agency intervention in existing irrigation and drinking water systems worsens the water supply and gives rise to numerous conflicts.¹² The improper design of structural work and the quality of the construction result not only in the inefficient delivery of water but can also lead to several conflicts.¹³ Technical matters, such as steep gradients of canals and

¹⁰ Gautam U., N. Agrawal and R. Subedi (Eds.) (1992). *Nepal Managing Large Surface Irrigation projects: A Participatory Review*. Study document NEP/89/006. Kathmandu: Department of Irrigation, HMG/Nepal; IIMI (1990), *Assistance to Farmers-Managed Irrigation Systems*. IIMI Country Paper-Nepal-No 3. Kathmandu: International Irrigation Management Institute-Kathmandu Office; IMC (Irrigation Management Centre) (1990) *Water Use Conflicts and Their Resolution in Selected Irrigation Systems in Nepal*. IMC Applied Study Report No 13. Pokhara: Irrigation Management Centre.

¹¹ Upreti, B. R., (2002). The Management of Natural Resource Conflict: Case Studies from Nepal. *European Bulletin of Himalayan Research*. Spring 2002 (22) Pp 37-60; IMC (Irrigation Management Centre) (1990) *Water Use Conflicts and Their Resolution in Selected Irrigation Systems in Nepal*. IMC Applied Study Report No 13. Pokhara: Irrigation Management Centre.

¹² See, Pradhan *et al.*, 1997; IMC, 1990; Upreti, 2001.

¹³ *Ibid* (IMC 1990)

laid pipelines, caused an excess of water in a particular area and an inequitable supply. Flat gradients also caused silt deposits and a reduction in water flow. Such technical difficulties also contributed to the occurrence of conflict. In the agency-developed systems constructed under contract arrangement, contractors are the major cause of conflict not only in new systems but also in the operation and maintenance of existing irrigation and drinking-water systems.¹⁴

In Nepal, most of the farmers managed irrigation systems (FMIS) practice some form of distribution rules and rotational water sharing, particularly in the peak water demand period. Therefore, they are effective in minimizing potential conflicts. Community coherence among the water users is high in the FMIS and community managed drinking water systems, and therefore, community-managed systems are more effective in monitoring water distribution, maintenance and operation and in resolving conflicts, should they occur.¹⁵ In the case of agency-developed systems, users are generally unwilling to contribute to operation and maintenance¹⁶ because of the lack of any feeling of ownership and accountability. Within the particular irrigation or drinking water system, conflict is frequently observed between the tail-section and head-section users in sharing water, particularly concerning the amount used and the time period. Basically, water availability determines the occurrence and frequency of conflicts. Generally, conflicts in the head-section – unlike those in the tail-section – were not a result of the lack of water; on the other hand, conflicts in the tail-section, in winter and spring, were mainly due to water shortages. The magnitude of a conflict grows as the gap between the demand and supply of water increases. Unequal water distribution is generally linked to

¹⁴ Pradhan R., F. Benda-Beckmann and K. Benda-Beckmann (Eds.) (2000). *Water Land and Laws: Changing Rights to Land and Water in Nepal*. Kathmandu: FREEDEAL.

¹⁵ Upreti, B. R., (2002). The Management of Natural Resource Conflict: Case Studies from Nepal. *European Bulletin of Himalayan Research*. Spring 2002 (22) Pp 37-60; Pradhan R., F. Benda-Beckmann, K. Benda-Beckmann, H.L. Spiertz, S. K. Khadka, and H. Azharul, (Eds.) (1997). *Water Rights, Conflicts and Policy*. Proceeding of Workshop held in Kathmandu, Nepal. Jan. 22-24, 1996. Kathmandu: International Irrigation Management Institute.

¹⁶ IIMI (1990), *Assistance to Farmers-Managed Irrigation Systems*. IIMI Country Paper-Nepal-No 3. Kathmandu: International Irrigation Management Institute-Kathmandu Office; IMC (Irrigation Management Centre) (1990) *Water Use Conflicts and Their Resolution in Selected Irrigation Systems in Nepal*. IMC Applied Study Report No 13. Pokhara: Irrigation Management Centre.

inadequate monitoring that allows greater access to head-section farmers. This is one of the major determinants of conflict concerning irrigation and drinking water.¹⁷ (IMC, 1990; Upreti, 2001).

In general, socio-economic, agricultural, organizational and technical factors contribute to the emergence of conflicts at the local level, whereas political interference and interests are responsible more for political conflict. Availability, reliability, equity and seasonality of water supply determine the occurrence and intensity of conflicts. Earlier research¹⁸ shows that there is a clear relationship between irrigation conflict and crop yields. Conflicts and cropping intensities are also positively related as both are affected by the availability of water.¹⁹ Nevertheless, it is not always predictable. In some cases, farmers changed their existing cropping patterns due to the scarcity of water and increased benefits, whereas in other cases their yields were decreased.

Local people use specific rules to determine the use of water. For example, if the water source is located on an individual's land, then they have full autonomy to use it themselves, but they have no authority to dictate who can use it for irrigation and how much to use within the community. One of the respondents of the research²⁰ explained that: "*A source owner uses a perennial water source located in his land whenever he likes. Only after he finishes his rice transplanting, then we get the chance to use this water source. But all community members share water from a common stream on a rotational basis*". However, in the case of stream water, which is common to all members of the community, there is a rule that all community members have equal rights to use it on a rotational basis.

In several externally-funded drinking-water projects, conflicts have erupted after a few years due to the scarcity of water and also because of the increase of the population in the village. While designing these systems, technicians

¹⁷ *Ibid* (IMC 1990); Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

¹⁸ *Ibid* (IMC 1990; Upreti 2001)

¹⁹ *Ibid* (IMC 1990)

²⁰ Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

generally ignore the potential future need for water²¹ citing financial and technical reasons. Another major conflict in externally funded drinking water projects is the location of the tap stands. Due to the influence of politicians, or for their own hidden interests, technicians locate the tap-stand close to the houses of particular people (mainly rich and powerful – sometimes negotiated with a bribe), disregarding other people's protests. Similarly, sharing the source is another problem in such projects, as they are decided on the basis of technical justifications, thus ignoring the existing use patterns and the social context. Once the projects are built only based on technical grounds without considering people's opinions and needs, local people may damage structures built in the source and cause the conflict to escalate.

There is also a growing debate about the hydrological effectiveness, economic viability and the managerial appropriateness of big versus small hydropower development projects, external investment in hydropower developments (who benefits and who loses), the risk factors involved and how to meet the nation's growing requirement of power. A group of scholars working in water issues such as Dipak Gywali, Ajaya Dixit (2001), Bikash Pandey (1994), and others strongly argue for the development of less risky hydropower projects and consistently question the development of export-led large hydropower projects. On the other hand, some conventional hydropower engineers, water policy experts, planners and developers prefer the option of developing big hydropower projects in order to export power to India. Some influential economists and politicians advocate the 'World Bank approach' of hydropower development (bigger projects) as the best solution to the economic development of the nation.²² However, many others differ with this view.²³ In Nepal, construction of bigger water related projects are often linked with corruption

²¹ Engineers from the District Water Supply Office explained that they provide for future needs in their designs and estimates. However, in practice such provisions were not observed. Local people say that overseers refuse to consider the future water requirements of the community while constructing drinking-water projects in the village basing them on budgetary limitations.

²² See, Mahat, R. S. (2005), *In Defense of Democracy: Dynamics and Fault Lines of Nepal's Political Economy*. New Delhi: Adroit Publishers.

²³ See, for example, Pandey, B. (1994), *Small Rather than Big: Case of Decentralized Power Development in Nepal*. *Water Nepal*. 4 (1), 181-190.

and malpractice. The latest examples of such malpractices are reported in the recommending of external power development companies to construct big hydropower projects in Nepal. The government announced the construction of the 402 MW Arun III and 300 MW Upper Karnali Hydro Electricity Projects and formed a High Level Committee to recommend the suitable hydro-power developers from among the 9 applicant companies for Arun III, and 14 applicant companies for Upper Karnali. However, The High Level Committee recommended granting both the projects to EMR Energy Company Limited (India). Hence, the media covered the story of possible kick-backs and ill-intention of the half of the Committee. Accordingly, the Parliamentary Natural Resource Committee is investigating the decision of the High Level Committee.²⁴ The issue of corruption and malpractice in Nepal's water resource development²⁵ is not different from the findings of Robert Wade in administrative and political corruption in irrigation projects in South India.²⁶ For example, details about the prevalence of corruption in the Asian Development Bank-funded Irrigation Sector Support Project (ISSP) have been widely documented in the past decades. The author has documented the details of the corruption practices of the Asian Development Bank-funded 6 km long irrigation development project called the Upper Andherikhola Irrigation System (UAIS) in Dolakha district with a total budget of 8 million. There had already existed a farmer managed irrigation system, but the irrigation technician changed the alignment in some sections of the existing canal and abused the allocated fund. The corruption case was filed in the District Administrative Office.²⁷

Several factors contributed to hydro-conflict in Nepal. But they can be summarized in the following groups:

²⁴ See *The Himalayan Times* of 9 May 2007 for more details.

²⁵ Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

²⁶ Wade R. (1982). The Study of Administrative and Political Corruption: Canal Irrigation in South India. *Journal of Development Studies*. 18(3): 287-328.

²⁷ Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

- Environmental concern versus economic concerns;
- Water as basic rights (and every person has the right to access safe water) versus water as tradable commodity (subsequent water privatization debate);
- Interest in the construction of big, risky export-led projects versus focus on small domestic consumption-oriented and less risky hydropower development;
- External (vested political and economic) interests versus internal need and interests;
- Internal politics and power relations;

These factors are not mutually exclusive and complement each other in igniting hydro-conflict. The degree and the intensity of influence in igniting hydro-conflict depends upon the combination of various factors as well as spatial and temporal situation.

In cases of conflict related to water resource development, Nepal finds itself in a state of 'paradigm confusion' (confusion over ontology, epistemology and methodology). Consequently, the political economy of hydro-politics in Nepal is very much oriented toward the conventional wisdom of international development politics (Millennium Development Goals, Sustainable Livelihoods, empowerment, etc.) without critically analyzing them (merits, limitations, potentials, relevance, vested interests, inherent weaknesses, implementation capability of the state, etc.). Such 'confusion' is one of the main causes of the failure of planned development in Nepal²⁸ and a perennial source of conflict.²⁹

²⁸ Panday D.R. (1999). *Nepal's Failed Development: Reflections on the Mission and the Melodies*. Kathmandu: Nepal South Asia Centre; Shrestha N. R. (1997). *In the Name of Development: A Reflection in Nepal*. Kathmandu: Educational Enterprise.

²⁹ Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wageningen University; Upreti, B. R., (2002). The Management of Natural Resource Conflict: Case Studies from Nepal. *European Bulletin of Himalayan Research*. Spring 2002 (22) Pp 37-60; Upreti, B. R. (2004), *The Price of Neglect: From*

South Asian Fresh Water Conflict: A Regional dimension for Nepal's Hydro-Politics

Several previous studies have amply demonstrated that India is at the centre of South Asian hydro-conflict,³⁰ be it with Nepal, Bangladesh or Pakistan. Hydro-tension between India and Pakistan in sharing the water of the Ravi, Sutlej and Beas rivers of Pakistan and the Indus, Jhelum and Chenab of India was reflected by the Indus Water Treaty of 1990; controversy over water sharing of the Koshi, Gandak, Tanakpur and Mahakali rivers between India and Nepal and the disputes between India and Bangladesh on lower riparian rights are the precise reflections of power relations and political interests.³¹

Although some research findings have shown that transboundary water resources can serve as means of cooperation.³² Nepalese experiences of international water basins, especially with India because of its geo-position, are full of controversy, tension and political trade-offs. Nepal, surrounded as it is by India to the East, West and South, and the fact that most of the rivers flow from North to South (and given virtually closed access to the Northern border with China due to topography) has made Nepal totally reliant on India in terms of transport and market access, thus making Nepal's position extremely weak in negotiations over water and other issues. The compulsory reliance of Nepal on India is often used by India for its own strategic interests, which are not necessarily advantageous to Nepal.

For Nepalese people, India's interests in dealing with Nepal, and with water resources in particular, are often equated with a 'Big Brother Attitude' or with

Resource Conflict to the Maoist Insurgency in the Himalayan Kingdom. Kathmandu, Brikuti Academic Publications.

³⁰ See, Swain, 1996; Panos South Asia, 2004; Begam, 1987; Ohlsson, 1995; Crow and Lindquist, 1990; Islam, 1987.

³¹ Baillat, A. (2004), *Hydropolitics in Small Mountain States. Two Cases of Cross-Asymmetries: The Kingdom of Lesotho and the Republic of South Africa, the Kingdom of Nepal and the Republic of India.* Geneva: Graduate Institute of International Studies; Swain, A. (1996), *The Environmental Trap: The Ganges River Diversion, Bangladeshi Migration and Conflicts in India.* Uppsala: Department of Peace and Conflict Research, University of Uppsala; Wolf, A. T. (2004), *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace.* Berlin: Adelphi Research; Dixit, A. and Gyawali, D. (2003), *A Cultural Theory Perspective on Environment and Scarcity in Nepal in: Environment, Development and Human Security* (ed.) Nijam, A. Boulevard: University Press of America.

³² *Ibid* (Wolf 2004)

'hegemonic interests'. For example, the continued insistence of India to construct the Sapta Koshi High Dam in Baraha Area, irrespective of the constant objection and resistance of local people of more than 11 villages of Nepal, is cited as one of several examples of India's hegemonic attitude. Other prominent examples of inundation problems faced by Nepalese people, because of dams constructed by India in the border regions, include Laxmanpur, Lotan Rasiawal Khurda and Mahalisager.³³ The Laxmanpur barrage is only 300 meters away from the Nepal-India border (pillar no 19) and inundates 3376 bigha (2247 hectares) of land, affecting more than 2600 houses and a population of more than 15,174. Similarly, Lotan Rasiawal Khurda dam is located 200 meters away from the border (pillar no 31 and inundates 33000 hectares agricultural lands and 13km² of land and affects 100 thousand people. Third, the Mahali Sagar dam built by India on the border with Nepal (25 meters away from border pillar 50) inundates 460 hectares of land and 1000 families are affected.³⁴ These problems have long been raised by the government of Nepal with India at the very highest levels (e.g., the then King Birendra raised this problem with the then Indian Prime Minister Rajiv Gandhi in 1985 during the Dhaka SAARC Summit). As a result, a joint Standing Committee on Inundation Problems was formed to address this problem.³⁵ However, people affected continued to suffer from inundation problems despite the formation of the standing committee. This is one of the main discontents fuelling the Nepalese people's perception of India's 'big brother' attitude.

Nepalese water diplomacy with India is said to be the product of short-sighted politics. In all the major political changes that Nepal has gone through (1950, 1990 and 2006), India has played a crucial role; it has also bargained hard on several occasions concerning Nepal's water resources. For example, after the political change of 1950, India and Nepal signed two treaties (Koshi in 1954 and Gandak in 1959) and then again two treaties after the political change in 1990

³³ Dixit, A., Adhikari, P.Thapa, R.R.(2004), *Ground Realities for Himalayan Water Management* in: Panos Institute South Asia (2004), *Disputes Over the Ganges: A Look at Potential Water Related Conflicts in South Asia*. Kathmandu: Panos Institute South Asia. Pp. 158-191.

³⁴ *Ibid*: 175, Table 3.

³⁵ *Ibid*.

(Tanakpur in 1991 and Mahakali-Pancheshwor in 1996); all the treaties³⁶ on sharing water between India and Nepal are largely said to have been framed to India's benefit. There is widely held opinion among the Nepalese people that the role of India in dealing with the water resources of Nepal is deliberately orchestrated to serve its vested interests. Some Nepalese scholars even see India as a perennial source of water-related problems for Nepal.³⁷ Madan Regmi, representing this view, argues that Nepalese water diplomacy with India lies within the shadow of India's domination in all major political changes of Nepal (1951, 1990, and 2006). Unlike the Nepalese views, some Indian scholars argue that India is part of the solution of Nepal's water problem.³⁸ Ashok Mehata, representing this view argues that India is not mainly the problem but largely the solution of Nepal's water disputes.

It is increasingly argued by 'rights activists' and 'critical analysts' in Nepal that the conventional paradigm of development adapted by Nepal considers water as a 'commodity' instead of as a basic right of people; this therefore is becoming a fundamental source of hydro-conflict.

Causes of Hydro-Conflict in Nepal

In reviewing the on-going debate of water issues in South Asia and Nepal, the following can be cited as some of the main sources of water conflict.

Policy and Institutional Issues

My conclusions stemming from ten years of study of the interrelationship between resource conflict and political conflict and the political economy of resource conflict in centralistic, unequal, hierarchical social settings and exclusionary governing systems, confirms that the reductionist policy and institutional approaches of hydropower management, shaped and guided by

³⁶ The major water related treaties with India were the Mahakali Treaty (signed in 1996 which includes also the agreements of two other dams already constructed by India: the Sarada barrage and the Tanakpur barrage, both on the Mahakali River), The Kosi River Treaty (1954) and the Gandak River Treaty (1959).

³⁷ Madan Regmi from the China Study Centre argued this line in an interview with BBC Nepali Service on 10 February 2007

³⁸ General Ashok Mehata said this in an interview with BBC Nepali Service on 10 February 2007.

technocratic engineering and economic interests, is the major cause of hydro-conflict.³⁹ Similar observations have also been made by some Indian scholars.⁴⁰ The water resource policy of Nepal is full of confusion and inconsistency, highly politicized, bureaucratically orchestrated and technocratically manipulated to justify these contradictions and confusions. There is no consistent, coherent and long term priority on how to effectively utilize available water resources for the economic development of the country. It is operating on an ad-hoc basis, depending upon the interests of the governing political party, or even invisibly controlled by the nexus of individual influential political leaders and external forces. Water resource institutions in Nepal are undermined by political trade-offs, corruption, overstaffing, incompetence and inadequacy in providing services to people. Several glaring examples include the 6 hours of load-shading and power cuts, controversy in Melamchi drinking water project, and the grand failure of the Arun II hydro-power project, to name just two.

The professionalism of bureaucracy is almost absent in Nepal. For example, the government of Nepal frequently transfers officers dealing with India on water issues and brings in people with a lack of experience. This all means that knowledge, experience-based competency and insights are not built-up and/or go wasted. This is in contrast to their Indian counterparts, who have often worked in the same water-related issues for decades. This creates not only a knowledge vacuum and lack of institutional memory on the part of the Nepalese, but it also weakens its hand in negotiations with India.

India Factor

India uses water as a 'means of political negotiation' and, therefore, trade-off in water resources is one of the main bases for this purpose. The discussion presented in section 3 clearly demonstrates the factor of India in Nepal's hydro-conflict. The power asymmetry with India and being surrounded by three

³⁹ See, Upreti, 1999; 2001; 2002; 2004.

⁴⁰ See, Mallik, B. and J. Bandyopadhyay (2004), *West Bengal: Reductionist Engineering and Conflict in: Panos Institute South Asia (2004), Disputes Over the Ganges: A Look at Potential Water Related Conflicts in South Asia*. Kathmandu: Panos Institute South Asia. Pp.55-90.

borders (with the northern side being geographically nearly inaccessible in the present context) places Nepal in an extremely difficult position, and it is further constrained by the mentality of Nepalese politicians. Despite the strong reiteration of heavy rhetoric, almost all political parties so far are failing to deal with India on a more equitable basis.

When there is a power crisis in Nepal many Indian companies not only show their interest but also offer their commitment to provide electricity. For example, in December 2006, when Nepal had experienced power shortages and the Nepal Electricity Authority offered a solution of the crisis as a routine electricity power cut, a private Indian energy company called Power Trading Corporation offered to provide 50 megawatts of hydro-power to Nepal within a month;⁴¹ but the promise was not fulfilled. However, many such offers have a strong element of interest in engaging in hydro-power development in Nepal. The recent selection of EMR Energy Limited to develop both Upper Karnali and Arun III Hydropower Projects of Nepal by the High Level Committee as an outcome of the nexus between them is an example of such interest.⁴²

Choice of Scale of Development in Water Sector

Another major area of hydro-conflict concerns the scale of infrastructure in water resources development. There is a continuous conceptual as well as operational tension between a) the preference for classical-large-scale export-oriented and externally-led water hydro-power development, and the construction of large -scale irrigation and drinking water projects and b) domestically-led-small scale hydropower and other water-related infrastructure development, which are more sustainable, manageable, quick and effective. Several overt and covert factors have contributed to this choice of scale of water resource development debate. They are not only linked with conceptual orientation, conviction and value systems but are also, and more importantly, shaped by vested interests. The ongoing debate over the Melamchi mega-drinking water project is one of the clearest examples of the debate over scale. Some people argue that instead of opting for this mega project, the government

⁴¹ *The Himalayan Times*, 6 December 2006.

⁴² See *The Himalayan Times*, 9 May 2007.

should have rectified the issue of leakage in the existing water supply system of Kathmandu. Similarly, the government should facilitate conserving small sources and maximize their use, explore small sources and spouts, protect many dying sources, and go for rain-water harvest. It has to explore all these possible options rather than going for extremely large projects which are financially external-dependent, technically too complicated, operationally too risky and managerially exclusionary (to be managed by external experts and technologists instead of consumers and users).

Diversity of Interests

The overt and covert interests in water resource development (be it hydropower development or the construction of irrigation systems or drinking water systems) often shape decisions. Ample evidence has demonstrated that such interests are not only sources of conflict and cooperation, but also a means of political negotiation and trade-off. In his study related to corruption, citing a vivid case of canal irrigation in South India, Robert Wade argues that administrative and political corruption is one of the major factors in pursuing bigger irrigation development.⁴³ Similarly, several research findings and media reports have documented many cases of corruption in water resource development in Nepal.⁴⁴ This is one of the main sources of conflict in Nepal. There are several actors engaged in water resources with their own vested interests in addition to the expressed or stated formal objectives. The following are the main actors engaged in water resource development with their own interests:

- Businessmen and traders with the main hidden interest of equipment sales and obtaining higher profits margins (which is mainly linked with

⁴³ Wade R. (1982). The Study of Administrative and Political Corruption: Canal Irrigation in South India. *Journal of Development Studies*. 18(3): 287-328.

⁴⁴ Thapa, H. B. (2002). *Anatomy of Corruption*. Kathmandu: Published by Sangita Thapa; Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

manipulation and opaque and invisible negotiations with bureaucrats and politicians).

- Water resource bureaucrats (bureaucratic control of the projects, process and outcomes, collection of bribes and corruption⁴⁵)
- Environmentalists, who argue from the environmental perspective, and who often ignore the economic importance of the development of water resource infrastructures. Unlike in many cases in other (mainly western) parts of the world, Nepalese environmental activists often make their arguments based on their perceptions instead of research findings. Hence the credibility of their argument is often low. However, they are often able to create larger interests among the general public and in some cases even stop the construction of bigger projects or at least alter their original approach.
- Donors and international investors. International investors and donors often heavily influence the development of water resources in Nepal. These influences are either related to direct involvement in construction and development, sale of equipment and services, control decision making such as scrapping subsidies, the privatization of water services offered by the government or public company or through directly controlling politics.
- Political actors (party politics and conceptual confusion about the long-term development of water resources).

⁴⁵ It is an open secret in Nepal that bureaucrats have to pay huge amounts to be posted in big infrastructure projects, customs and immigration offices, and even forestry offices. Hence, their very first objective is to compensate what they paid for the senior bureaucrats and politicians and therefore corruption (rent seeking and bribe) is the first priority of their job. They can easily escape even from corruption charges if they have collected enough money to influence the mechanisms investigating corruption. Nepal's strange record of the winning of corruption cases by almost all the alleged corrupt officials (politicians and bureaucrats) is the single biggest evidence of how powerful is corruption.

Addressing Hydro-Conflict in New Nepal

As this beautiful country is in the process of transformation from war to peace, hopelessness and helplessness are also being transformed into expressions of optimism and ambition for a prosperous new Nepal. The immense potential of water resources in the country forms a basis for such optimism and ambition. However, the logical question is whether Nepal can utilize the potential of water resources for economic development that benefits poor, marginalized, socially excluded, powerless and voiceless people. Can water-led economic development ensure social justice, equity and address those structural inequalities that exist in Nepalese society that constitute a perennial source of conflict and insecurity? Answers to these questions depend upon the following issues.

Public Engagement

The events of April 2006 clearly demonstrated that Nepalese people are capable of determining their own destiny and addressing the ever-growing issues of water scarcity and water conflict. In the past, one of the main sources of conflict and crisis in the water sector was mainly derived from the autocratic, top-down, techno-centric and exclusionary decision-making, and the elite-centric, power-focused and selective benefit-capturing culture. As long as this culture exists in the water sector, crises will exist side-by-side. Therefore, it is absolutely essential to re-examine a few fundamental questions such as who makes the choice, who makes decisions, who benefits and who suffers, and so move beyond the classical top-down exclusionary approach.

The ongoing state restructuring process, and particularly the much anticipated federal political structure of the country, will have great implications in changing the existing almost dysfunctional water bureaucracy and its exclusionary structures. Hopefully, this state restructuring will abolish the centrally controlled decision-making process and ensure public engagement in making any important water-related decisions and action.

New Foreign Policy and International Relations

As discussed in the above sections, Nepal's water resource management and hydro-conflict exhibits a very strong international dimension. Nepal's existing foreign policy is neither shaped by national strategic interests nor economic opportunities. Rather, it has traditionally been orchestrated, negotiated, manipulated, refined and reshaped by the vested interests of the palace and a few political elites. Hence, serious trade-offs, negotiations and bargaining over water resources have resulted in tension and conflict. Therefore, addressing water crisis and conflict in Nepal needs a wider vision as well as a conducive foreign policy and non-conventional ways of building relations, based on a more equitable and just basis. This, however, is not easy in a country where real actions have been diluted by rhetoric and false promises.

Nepal's foreign policy should be shifted toward economic diplomacy, targeting the promotion of economic collaboration, and harnessing and promoting the development of potential sectors such as water resources, tourism and information technology.

New Economic Development Policy and Institutional Arrangements

Challenges faced by the water resource sector in Nepal cannot be handled by the existing institutional arrangement and policy framework, simply because they are obsolete in addressing what are complicated issues. The water resource development policy needs to be integrated with foreign policy into a holistic vision. A new policy requires new institutional arrangements. One of the major institutional issues is the restructuring of the existing non-responsive and classical set-up of the Ministry of Water Resources and its related departments and offices. However, it is not possible to restructure the ministry in isolation and it has to be done as an integral part of a holistic bureaucratic restructuring. Redefining the existing governing system, ministerial and departmental arrangements, size, responsibility and accountability of the staff, their evaluation, rewards and punishment and placing them under the oversight of taxpayers of the country is all necessary. Such reorientation is strongly related to the federal political structure of the country.

Human Security as New Orientation, Thinking and Perspective

Nepal needs new thinking and perspectives in regard to the development of the water resource sector. The conceptual orientation and broader framework has to be guided by the human security perspective. Human security is a holistic perspective which goes beyond conventional notions of poverty alleviation or livelihood improvement at the individual level. It focuses on all aspects of security beyond the individual level and links with the all aspects of the livelihood of people. The following are integral parts of human security:

- Energy Security

New water resource management and development should be focussed on addressing the energy needs of the country. Nepal is suffering from a lack of energy which is negatively affecting all sectors (from industries to health to services). The lack of sufficient energy is also negatively affecting economic growth and the generation of employment. Hence, the priority of the state should be to ensure the reliable supply of energy essential for domestic and industrial requirements.

- Environmental Security

Another important condition for water resource development and improving the overall development of the nation is to give due consideration to environmental security, which is often neglected in the development discourse. Environmental security implies not only the security of the surrounding environment but also the security of people staying in and around a particular area. New water resource development policy should acknowledge the necessity of the concept of environmental security in future water resource development.

- Livelihood Security

Livelihood security is another concept that needs to be brought into the mainstream in terms of Nepal's water resource development. Key actors need to understand the inter-relationship between livelihood security and water resource management, as they are closely inter-linked. If water-related development projects and programs are not able to contribute to the livelihood

security of people, they will not get public support and they will fail simply on the grounds of public resistance, mistrust or the lack of ownership.

- *Rights, Equity, and Social Justice*

The discourse on water resources now needs to focus on rights, equity and social justice. Rights-based and holistic approaches of water resource management and development, framed in terms of equity and social justice, are fundamentally important. Riparian rights, rights over usage (for example, prior rights for drinking water over irrigation or industrial use), and especially the rights of the indigenous community, including traditional or customary rights over water, are some of the common issues that are not only influencing the water debate⁴⁶ but also becoming sources of conflict and tension once they are violated by external interventions.⁴⁷ New rights-related issues, such as water as a basic right of people, are becoming increasingly important and, therefore, water should not be treated simply as a tradable commodity. Proponents of this school of thought argue that access, use, management and the control of water must be guided by equity and social justice. Hence, this issue must be sufficiently considered in any new water resource development policy and practice in order to overcome potential hydro-conflict.

Bureaucratic Reorientation, Political Commitment and Action

The existing bureaucracy is too ineffective, irresponsible, corrupt, politicized and is, therefore, not able to tackle the challenges faced by Nepal, particularly in regard to water resource management. The main political actors, including the ministers, are heavily engaged in spoiling the bureaucracy. They have abused their power and authority in damaging the bureaucracy. Hence, bureaucratic

⁴⁶ Pradhan R. and U. Pradhan. 1996. Staking a Claim: Law Politics and Water Rights n Farmers Managed Irrigation Systems in Nepal in: J. Spiertz, and M. Wiber (Eds.), *The Role of Law in Natural Resource Management*. VEGA Publications. Pp. 61-76; Benda-Beckmann F., K. Benda-Beckmann, R. Pradhan, and H. L. Spiertz. (1997). Introduction in: R. Pradhan, F. Benda-Beckmann, K. Benda-Beckmann, H.L. Spiertz, S. K. Khadka, and H. Azharul (Eds.). *Water Rights, Conflicts and Policy*. Kathmandu: FREEDEAL Pp. 1-11.

⁴⁷ Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wagenignen University.

reorganization and reorientation is a precondition to effectively and efficiently managing available water resources in Nepal. This requires political commitment and sincere action.

Constructive International Engagement

The role of the international community is crucial in water resource development, particularly in regards to the development of hydropower in Nepal. Multinational companies, mainly backed up either by the government of their native origins or multilateral financial institutions such as the World Bank, have shown interest in developing hydropower in Nepal. Once powerful countries are engaged in promoting particular multinational companies, they exert an unbearably high pressure on the Nepalese government. In such a situation, the role and negotiation capacity of users and the communities is marginalized, and consequently, hydropower development does not address their problems and only serves the interests of international investors. The Nepalese history of water resource development is characterized by unfair international pressure and trade-offs. The continuity of such practices will implant conflict and tension in the water sector. Therefore the strategy of the international community, particularly the bilateral governments and the multilateral financial institutions like the World Bank, International Monetary Fund and the Asian Development Bank needs to be shifted from pressure and condition to facilitation/harmonization to support the economic development of Nepal through the utilization of available water resources. Nepal needs international actors to play a more constructive and supportive role in developing water resources that ensures the concerns of people are met, and one that minimizes potential conflict and provides mutual benefits to all concerned actors. So far, the role of influential international actors such as the Asian Development Bank (ADB), World Bank, International Monetary Fund and some bilateral donors in water resource development are seriously questioned in Nepal, particularly for their conditionality associated with assistance. For example, when the conditions posed by the ADB to provide the contract of distributing drinking water in Kathmandu valley to a London-based private company were questioned by the newly appointed Housing and Physical

Planning Minister (who was representing the CPN-Maoist party in the government), the ADB in the 1st week of May 2007 threatened to cancel the loan assistance for the Melamchi Drinking Water Project.⁴⁸ This case has clearly demonstrated the clash of corporate interests and the public interests. In this case Bhandari writes, “*But still water supply services for Kathmandu Valley are being privatized as per ADB’s loan conditionalities*” with the intention that “*water should be allocated and used by those who can best afford it.*”⁴⁹

International funding agencies often see the private sector as the solution of chronic drinking water problems in cities and this, therefore, seriously undermines the crucial role played by the public sector and so poses different conditions to pursue the privatization of drinking water (infrastructure development, operation, processing, distributions, etc.). The conditions imposed in the Melamchi Drinking Water Project constitute the most vivid example of this attitude of international actors. Pressuring to pursue corporate interests often cause several economic, social and environmental negative impacts. Bhandari⁵⁰ argues that the experiences of the privatization of drinking water in Argentina, Hungary, Czech Republic, Philippines (Manila), Indonesia (Jakarta) sponsored by the World Bank and other international financial institutions, demonstrate that they are not able to improve performance and meet public needs; rather they face several problems. Instead, drinking water managed by public institutions in Cambodia, India, Thailand, Bangladesh, Pakistan etc. are performing better than the drinking water managed by the private sector in Manila and Jakarta.⁵¹ Hence, the role of the international community, particularly the financial institutions, should not be to impose conditions in developing water resources in Nepal but to assist this country in meeting the growing energy and drinking water need.

⁴⁸ See the *The Himalayan Times* of 9 May 2007 for detail.

⁴⁹ Bhandari, Ram Kumar. Drinking Water Management: Can Privatization Solve Problems? *The Himalayan Times*, May 9, 2007.

⁵⁰ *Ibid.*

⁵¹ *Ibid.*

Linking Water Resource Management with Social Research

Water resource development and management in Nepal is not well grounded in social research and is almost entirely dominated by engineering and technical discourse. This approach to water resource management – that relegates social issues – has created enormous tensions and conflict during the planning and implementation of projects. Numerous examples can be cited from the history of bigger hydropower developments or drinking water projects. There is a lack of systematic engagement in examining social, historical, cultural and economic aspects of local areas where bigger water-related projects are constructed. The sociological exploration of potential complications and consequent conflict are largely ignored in bigger water-related projects. Even if some social studies are made, they are often ad hoc, superficial and not able to bring future possible complications to light and offer ways to resolve them. Hence, a focus on social research –with especial emphasis on ‘Conflict Impact Assessment’ – should be an integral part of water discourse in Nepal.

Conclusion

The changing political context and the emerging new power relations in Nepal will have huge impacts on water resource management in general and in dealing with hydro-conflict. The interim government is a coalition of political parties with diverse interests, political orientations and objectives. In the past, water resource management and “mismanagement” was largely dominated by the policy and strategy of the Nepali Congress Party – this is not the case anymore. One of the main actors in the government are the Maoists, whose strategy has yet to be tested, but who argue a different approach from what has been done in the past. In the past, water resource development was mainly shaped by vested interests and corruption; but to some degree this is likely to improve given the increased scrutiny from the population, civil society and difference in interests among the major political parties. This situation will continue in the long term, too.

The new situation Nepal finds itself in will alter the existing approach of water resource management and hydro-conflict in the country. However, it depends

upon a) the transformation of thinking, behavior and attitude of the major actors; b) the transformation of the political context (stability factor); c) the transformation of rules, policy and institutional arrangements; d) dynamic, robust and organic negotiations, e) stable, progressive and people-centric power relations (which is possible).

The changing political context and altered power relations has brought tremendous opportunities and serious challenges for addressing water-related problems and conflict in Nepal. If the emerging new political and social actors are able to use the opportunities brought about by political change, the water resource sector can greatly contribute to the economic development of the country. This will open-up avenues for new forms of water-based relations with India and contribute to addressing tensions over water in the wider region of South Asia. But if the political actors of Nepal fail to use wisely the opportunities afforded to them and get entangled in vested interests and narrow party politics, as they did in the past, then they will face even more challenges and difficulties.

References

- Begum, K. (1987), *Tension Over the Farakka Barrage: A Techno-political Tangle in South-Asia*. Dhaka: University Press Limited.
- Baillat, A. (2004), *Hydropolitics in Small Mountain States. Two Cases of Cross-Asymmetries: The Kingdom of Lesotho and the Republic of South Africa, the Kingdom of Nepal and the Republic of India*. Geneva: Graduate Institute of International Studies.
- Benda-Beckmann F., K. Benda-Beckmann, R. Pradhan, and H. L. Spiertz. (1997). Introduction in: R. Pradhan, F. Benda-Beckmann, K. Benda-Beckmann, H.L. Spiertz, S. K. Khadka, and H. Azharul (Eds.). *Water Rights, Conflicts and Policy*. Kathmandu: FREEDEAL Pp. 1-11.
- Bhandari, Ram Kumar. Drinking Water Management: Can Privatization Solve Problems? *The Himalayan Times*, May 9, 2007.
- Crow, B. and Lindquest, A. (1990), *Development of the Rivers Ganges and Brahmaputra: The Difficulty of Negotiating a New Line*. Milton Keyes: Development Policy and Practice Research Group.
- Dixit, A. and Gyawali, D. (2003), A Cultural Theory Perspective on Environment and Scarcity in Nepal in: *Environment, Development and Human Security* (ed.) Nijam, A. Boulevard: University Press of America.
- Dixit, A., Adhikari, P.Thapa, R.R.(2004), Ground Realities for Himalayan Water Management in: Panos Institute South Asia (2004), *Disputes Over the Ganges: A Look at Potential Water Related Conflicts in South Asia*. Kathmandu: Panos Institute South Asia. Pp. 158-191.
- Gautam U., N. Agrawal and R. Subedi (Eds.) (1992). *Nepal Managing Large Surface Irrigation projects: A Participatory Review*. Study document NEP/89/006. Kathmandu: Department of Irrigation, HMG/Nepal.
- Gyawali, D. and Dixit, A. (2001), Water and Science: Hydrological Uncertainties, Developmental Inspirations and Uningrained Scientific Culture. *Future*, 33, Pp. 689-708.

- IIMI (1990), *Assistance to Farmers-Managed Irrigation Systems*. IIMI Country Paper-Nepal-No 3. Kathmandu: International Irrigation Management Institute-Kathmandu Office.
- IMC (Irrigation Management Centre) (1990). *Water Use Conflicts and Their Resolution in Selected Irrigation Systems in Nepal*. IMC Applied Study Report No 13. Pokhara: Irrigation Management Centre.
- Islam, M. R. (1987), *Ganges Water Dispute: Its International Legal Aspects*. Dhaka: University Press Limited.
- Mahat, R. S. (2005), *In Defense of Democracy: Dynamics and Fault Lines of Nepal's Political Economy*. New Delhi: Adroit Publishers.
- Mallik, B. and J. Bandyopadhyay (2004), West Bengal: Reductionist Engineering and Conflict in: Panos Institute South Asia (2004), *Disputes Over the Ganges: A Look at Potential Water Related Conflicts in South Asia*. Kathmandu: Panos Institute South Asia. Pp.55-90.
- Ohlsson L. (Ed.) (1995). *Hydropolitics: Conflict over Water as Development Constraints*. London and New Jersey: ZED Books.
- Panday D.R. (1999). *Nepal's Failed Development: Reflections on the Mission and the Melodies*. Kathmandu: Nepal South Asia Centre.
- Pandey, B. (1994), Small Rather than Big: Case of Decentralized Power Development in Nepal. *Water Nepal*. 4 (1), 181-190.
- Panos Institute South Asia, (2004); *Disputes Over the Ganges: A Look at Potential Water Related Conflicts in South Asia*. Kathmandu: Panos Institute South Asia.
- Phillips, D. J. H., M. Danoudy, J. Ojendal, A. Turton and S. McCaffrey (2006), *Trans-boundary Water Cooperation as a Tool for Conflict Prevention and for Broader Benefit Sharing*. Stockholm: Ministry for Foreign Affairs, Sweden.
- Pradhan R. and U. Pradhan. 1996. Staking a Claim: Law Politics and Water Rights n Farmers Managed Irrigation Systems in Nepal in: J. Spiertz, and M. Wiber (Eds.), *The Role of Law in Natural Resource Management*. VEGA Publications. Pp. 61-76.

- Pradhan R., F. Benda-Beckmann and K. Benda-Beckmann (Eds.) (2000). *Water Land and Laws: Changing Rights to Land and Water in Nepal*. Kathmandu: FREEDEAL.
- Pradhan R., F. Benda-Beckmann, K. Benda-Beckmann, H.L. Spiertz, S. K. Khadka, and H. Azharul, (Eds.) (1997). *Water Rights, Conflicts and Policy*. Proceeding of Workshop held in Kathmandu, Nepal. Jan. 22-24, 1996. Kathmandu: International Irrigation Management Institute.
- Shrestha N. R. (1997). *In the Name of Development: A Reflection in Nepal*. Kathmandu: Educational Enterprise.
- Swain, A. (1996), *The Environmental Trap: The Ganges River Diversion, Bangladeshi Migration and Conflicts in India*. Uppsala: Department of Peace and Conflict Research, University of Uppsala.
- Thapa, H. B. (2002). *Anatomy of Corruption*. Kathmandu: Published by Sangita Thapa.
- Upreti B. R. (1999). *Managing local Conflicts over Water Resources: A Case Study from Nepal*. AgREN, ODI Network Paper No 95, July 1999. London: Overseas Development Institute.
- Upreti, B. R. (2001). *Conflict Management in Natural Resources: A Study of Land, Water and Forest Conflict in Nepal*. Published PhD Dissertation. Wageningen University.
- Upreti, B. R., (2002). *The Management of Natural Resource Conflict: Case Studies from Nepal*. *European Bulletin of Himalayan Research*. Spring 2002 (22) Pp 37-60.
- Upreti, B. R. (2004), *The Price of Neglect: From Resource Conflict to the Maoist Insurgency in the Himalayan Kingdom*. Kathmandu, Brikuti Academic Publications.
- Upreti, B. R. (2006), *Armed Conflict and Peace Process in Nepal: The Maoist Insurgency, Past Negotiation and Opportunities for Conflict Transformation*. New Delhi: Adroit Publishers.
- Wade R. (1982). *The Study of Administrative and Political Corruption: Canal Irrigation in South India*. *Journal of Development Studies*. 18(3): 287-328.

- Wolf, A. T. (2004), *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace*. Berlin: Adelphi Research.

**Annex 1 12-Point Understanding Between Seven Parties and the Maoists
Kathmandu, 22 Nov. 2005.**

1. Today, democracy, peace, prosperity, social advancement and a free and sovereign Nepal is the chief wish of all Nepalese. We completely agree that autocratic monarchy is the main hurdle in (realising) this. It is our clear view that without establishing absolute democracy by ending autocratic monarchy, there is no possibility of peace, progress and prosperity in the country. Therefore, an understanding has been reached to establish absolute democracy by ending autocratic monarchy, with all forces against the autocratic monarchy centralizing their assault against autocratic monarchy from their respective positions, thereby creating a nationwide storm of democratic protests.
2. The seven agitating parties are fully committed to the fact that only by establishing absolute democracy through the restoration of the Parliament with the force of agitation, forming an all-party government with complete authority, holding elections to a constituent assembly through dialogue and understanding with the Maoists, can the existing conflict in the country be resolved and sovereignty and state power completely transferred to the people. It is the view and commitment of the CPN (Maoist) that the above mentioned goal can be achieved by holding a national political conference of the agitating democratic forces, and through its decision, forming an interim government to hold constituent assembly elections. An understanding has been reached between the agitating seven parties and the CPN (Maoist) to continue dialogue on this procedural work-list and find a common understanding. It has been agreed that the force of people's movement is the only alternative to achieve this.
3. Today, the country has demanded the establishment of permanent peace along with a positive solution to the armed conflict. Therefore, we are committed to ending autocratic monarchy and the existing armed conflict, and establishing permanent peace in the country through constituent assembly elections and forward-looking political outlet. The CPN (Maoist) expresses its commitment to move along the new peaceful political stream

through this process. In this very context, an understanding has been reached to keep, during the holding of constituent assembly elections after ending autocratic monarchy, the armed Maoist force and the royal army under the supervision of the United Nations or any other reliable international supervision, to conclude the elections in a free and fair manner and accept the result of the elections. We expect reliable international mediation even during the dialogue process.

4. Expressing clearly and making public institutional commitment to the democratic norms and values like the competitive multiparty system of governance, civil liberties, human rights, the concept of the rule of law, fundamental rights etc, the CPN (Maoist) has expressed commitment to move forward its activities accordingly.
5. The CPN (Maoist) has expressed its commitment to create an environment allowing the political activists of other democratic parties displaced during the course of the armed conflict to return to their former localities and live there with dignity, return their home, land and property seized in an unjust manner and carry out their activities without let or hindrance.
6. Undertaking self criticism and self evaluation of past mistakes, the CPN (Maoist) has expressed commitment not to repeat such mistakes in future.
7. The seven political parties, undertaking self evaluation, have expressed commitment not to repeat the mistakes of the past which were committed while in parliament and in government.
8. In the context of moving the peace process forward, commitment has been expressed to fully respect the norms and values of human rights and press freedom and move ahead accordingly.
9. As the announcement of municipal polls pushed forward with the ill-motive of deluding the people and the international community and giving continuity to the autocratic and illegitimate rule of the King, and the talk of elections to Parliament are a crafty ploy, we announce to actively boycott them and call upon the general public to make such elections a failure.

10. The people and their representative political parties are the real guardians of nationality. Therefore, we are firmly committed to protecting the independence, sovereignty, geographical integrity of the country and national unity. Based on the principle of peaceful co-existence, it is our common obligation to maintain friendly relations with all countries of the world and good-neighbour relationship with neighbouring countries, especially India and China. But we request the patriotic masses to be cautious against the false attempt by the King and (his) loyalists to prolong his autocratic and illegitimate rule and delude the patriotic people by projecting the illusory "Mandale" nationalism and questioning the patriotism of the political parties, and appeal to the international powers and the people to support, in every possible way, the democratic movement against autocratic monarchy in Nepal.
11. We call upon the civil society, professional organizations, various wings of parties, people of all communities and regions, press and intellectuals to actively participate in the peaceful movement launched on the basis of these understandings centered on democracy, peace, prosperity, forward-looking social change and the country's independence, sovereignty, and pride.
12. Regarding the inappropriate conducts that took place between the parties in the past, a common commitment has been expressed to investigate any objection raised by any party over such incidents, take action if found guilty, and to make the action public. An understanding has been reached to settle any problem emerging between the parties through peaceful dialogue at the concerned level or at the leadership level.

Annex 2. Comprehensive Peace Agreement [Signed by the Nepal Government and the CPN (M) on 22 November 2006, 8.29 PM, (Unofficial translation)]

Preamble:

Respecting people's mandate for democracy, peace and progress expressed through repeated historic people's movement and struggles since 1951,

Reaffirming commitments to the 12-point and 8-point agreements, and 25-point code of conduct between the seven parties and the Maoists; decisions taken during the meeting of the top leaders of the seven parties and the Maoist on November 8 along with other agreements, understandings, code of conducts and letter sent to the United Nations stating identical viewpoints by the Maoists and the Nepal government,

Pledging for progressive restructuring of the state by resolving prevailing problems related with class, ethnicity, regional and gender differences,

Reiterating commitments to competitive multiparty democratic system, civil liberties, fundamental rights, human rights, complete press freedom, rule of law and all other norms and values of democratic system,

Pledging commitments to Universal Declaration of Human Rights 1948 and other international humanitarian laws and values and principles of the human rights,

Guaranteeing the fundamental rights of the Nepalese people to cast their votes in the constituent assembly polls without any kind of fear,

By putting democracy, peace, prosperity, progressive social and economic transformation, independence, integrity, sovereignty and prestige of the state in the centre-stage, implement the commitments made by both the sides to hold the election to constituent assembly by mid June 2007 in a free and fair manner,

Declaring the end of armed conflict prevailing in the country since 1996 and beginning the new era of peace and co-operation as per the understanding reached between both the sides for guaranteeing the sovereignty of the Nepalese people, progressive political solution, democratic restructuring of the state and

social, economic and cultural transformation of Nepalese society through the constituent assembly,

Committing to transforming the ceasefire between the Nepal government and the Maoists into permanent peace, the following comprehensive peace agreement has been reached between the Nepal government and the Communist Party of Nepal (Maoist).

1. Preliminary

- 1.1. This agreement shall be called 'Comprehensive Peace Agreement, 2006'. In short this shall be called peace agreement.
- 1.2. This agreement shall come into effect through public announcement by both the government and the Maoists.
- 1.3. Both the sides shall issue directives to all the agencies under them to follow and implement this agreement immediately and shall implement it.
- 1.4. All agreements, understandings, code of conduct and decision taken by the Government, the Maoists and the seven parties enlisted in the appendix shall be inseparable part of this agreement.
- 1.5. The agreements and understanding to be signed later to implement this agreement shall also be regarded as part of this agreement

2. Unless the subject or context otherwise requires, in this agreement:

- a. Ceasefire shall mean restriction of all kinds of attacks, abduction, disappearance, imprisonment, mobilisation and strengthening of the armed force, attacking or armed actions targeted against each other between the Nepal government and the Maoists and any form of destructive, provoking or inciting activities in the society.
- b. 'Interim constitution' shall mean the 'Interim Constitution of Nepal 2006' to be promulgated and exercised until a new constitution is written through Constituent Assembly.
- c. 'Interim cabinet' shall mean the council of minister formed as per the interim constitution.

- d. 'Both Parties' shall mean Nepal government and the Communist Party of Nepal (Maoist).
- e. 'Prevailing laws' shall mean the interim constitution and other existing Nepalese laws that are not inconsistent with this constitution. However, this definition shall not affect the existing legal system in the country before the announcement of the interim constitution.
- f. 'Verification' would mean the preparation of the detailed situation of the army, combatants and arms by the United Nations after verification.

3. Political, social, economic transformation and conflict management

Both parties have agreed to formulate following programmes and policies for political, social and economic transformation and management of the existing conflict through positive means:

- 3.1 Based on the decision taken by the meeting of the top leaders of the seven parties and the Maoists (schedule 6) on November 8, guarantee progressive political, economic and social transformation.
- 3.2 Form the interim legislative – parliament, as per the interim constitution, the interim government shall hold election to constituent assembly elections by mid-June 2007 in free and fair manner and make the Nepalese people feel their inherent sovereign right.
- 3.3 No rights of state administration shall remain with the King. Bring the properties of late King Birendra, late Queen Aishwarya and their family members under the control of the Nepal government and use it for the welfare purposes through a trust. All properties acquired by King Gyanendra by the virtue of him being the King (like palaces of various places, forests and conservation areas, heritage having historical and archaeological importance) shall be nationalised. Determine the fate of the institution of monarchy by the first meeting of the Constituent Assembly through simple majority vote.

- 3.4 Promulgate the political system that fully comprehends with the concepts of universally adopted principles of fundamental human rights, multiparty competitive democratic system, sovereign rights inherent in the people and supremacy of the citizens, constitutional balance and control, rule of law, social justice and equality, independent judiciary, periodic elections, monitoring by the civil society, complete press freedom, right to information of the citizens, transparency and accountability of the activities of the political parties, people's participation, fair, able and uncorrupted administrative mechanism.
- 3.5 End the existing centralised and unitary state system and restructure it into an inclusive, democratic progressive system to address various problems including that of women, Dalits, indigenous community, Madhesis, oppressed, ignored and minority communities, backward regions by ending prevailing class, ethnic, linguistic, gender, cultural, religious and regional discrimination.
- 3.6 End all forms of feudalism and prepare and implement a minimum common programme of socio-economic transformation on mutual understanding.
- 3.7 End feudal land ownership and formulate the policies for scientific land reforms.
- 3.8 Adopt policies for protection and promotion of national industries and resources.
- 3.9 Adopt policies for establishment of civil rights in education, health, shelter, employment and food security.
- 3.10 Adopt policies to provide land and socio-economic security to backward groups like landless, bonded labourers, tillers, Haruwa-charuwa and other such groups, which are socio-economically backward.
- 3.11 Adopt policies to take strict actions against the people who have worked in government positions and have amassed huge amount of properties through corruption.

- 3.12 Prepare a common development concept that will help in socio-economic transformation of the country and will also assist in ensuring the country's economic prosperity in a short period of time.
- 3.13 Follow policies ascertaining the professional rights of workers and increase investment on sectors like promoting industries, trade and export and increase employment and income generating opportunities.

4. Management of armies and arms

To hold the election of constituent assembly in free, fair and peaceful environment and democratisation and restructuring of the army, the following works shall be done as per the 12-point and 8-point agreements, and 25-point code of conduct, 5-point letter sent to the United Nations and decisions taken during the meeting of the top leaders on November 8:

Relating to Maoist army –

4.1 As per the commitments expressed in the joint letter sent to the United Nations by the Nepal government and the Maoists on August 9, the combatants of the Maoists would remain in the following temporary camps. United Nations would do their verification and monitoring.

1. Kailali,
2. Surkhet,
3. Rolpa,
4. Nawalparasi,
5. Chitwan,
6. Sindhuli
7. Ilam.

There would be three smaller camps located in the periphery of each of these main camps

4.2 All the arms and ammunitions would be securely stored in the camps except those needed for providing security of the camp after the Maoist combatants

are sent to the cantonments. They will be put under a single lock system and the concerned side would keep the key of this lock. For the UN to monitor it, a device with siren as well as recording facility will be installed. When there is need to examine the stored arms, the UN would do so in the presence of the concerned side. Prepare the details of technology including camera for monitoring as per the agreement among the Nepal government, the Maoists and the United Nations.

- 4.3 On completion of cantonment of the Maoist combatants, Nepal government would take up the responsibility for providing ration and other facilities to them.
- 4.4 The interim cabinet shall form a special committee to carry out monitoring, integration and rehabilitation of the Maoist combatants.
- 4.5 Make arrangement for the security of the Maoist leaders as per the agreement with the Nepal government.

Relating to the Nepali Army

- 4.6 The Nepali Army would be confined to the barracks as per the commitments expressed in the letter sent to the United Nations. Guarantee that its arms would not be used for or against any side. Keep similar quantity of arms of the Nepali Army in the store, seal it with single-lock system and give the key to the concerned side. For the UN to monitor it, a device with siren as well as recording facility will be installed. When there is need to examine the stored arms, the UN would do so in the presence of the concerned side. Prepare the details of technological arrangement including camera for monitoring as per the agreement among the Nepal government, the Maoists and the United Nations.
- 4.7 The cabinet would control, mobilise and manage the Nepali Army as per the new Military Act. The interim cabinet would prepare and implement the detailed action plan of democratisation of the Nepali Army by taking suggestions from the concerned committee of the interim parliament. This includes works like determination of the right number of the Nepali Army,

prepare the democratic structure reflecting the national and inclusive character, and train them on democratic principles and human rights values

4.8 Continue the works of the Nepali Army such as border security, security of the conservation areas, protected areas, banks, airport, power house, telephone tower, central secretariat and security of VIPs.

5. Ceasefire

5.1. *End of armed rebellion and mobilisation of armed forces:-*

5.1.1. Both parties commit not to carry out the following activities:-

- a. Acts of attacking or using arms directly or indirectly against each other
- b. Seizing or raiding places where the arms of other side has been stored as per the mutual understanding, with or without arms,
- c. Acts that would cause mental pressure or loss to any individual person
- d. Acts to place ambush targeting each other
- e. Actions involving killing or violence
- f. Acts of abduction, arrest, imprisonment, disappearance
- g. Destruction of public, private, governmental or military properties
- h. Aerial attacks or bombarding
- i. Mining or sabotaging
- j. Acts of spying each other's military activities

5.1.2 Both parties shall not carry on further recruitments, shall not transport the arms and ammunition or pose difficulties militarily against each other. But the interim cabinet shall mobilise the security forces for search and patrol to stop the acts like illegal transportation of arms, explosives or their parts or raw material in borders or customs points.

5.1.3 No individuals or groups shall travel with arms, ammunition or explosives

- 5.1.4 Both parties shall inform each other about the demarcation and storage of ambush or mines planted during the war period within 30 days and help each other to diffuse or dispose them off within 60 days.
 - 5.1.5 Armies of both parties shall not appear with arms or combat dresses in any civil meeting, political gathering or public programmes.
 - 5.1.6 Nepal Police and Armed Police force shall continue to work for maintaining peace and investigation into the criminal activities as per the spirit and content of the peace agreement and prevailing laws.
 - 5.1.7 Both parties shall instruct their armed forces directing them to stop telling or behaving with the other side's armed personnel as 'enemy'.
 - 5.1.8 Both parties agree to prepare the details of the governmental, public, private building, land or other properties captured, locked or restricted from being used during the period of armed conflict and return these things immediately
- 5.2. *Ways of normalising the situation:*
- 5.2.1 There won't be cash or kind collection or tax collection against anyone's will or existing laws.
 - 5.2.2 Both parties agree to publicise and release all the person kept under detention within 15 days.
 - 5.2.3 Prepare the details of the disappeared persons or those killed in the conflict with their real name, surname and residential address and publicise it within 60 days from the day of signing this agreement and inform the family members of concerned persons.
 - 5.2.4 Both parties agree to form a national peace and rehabilitation commission to initiate process of rehabilitation and providing relief support to the persons victimised by the conflict and normalise the difficult situation created due to the armed conflict.

- 5.2.5 Both parties agree to form a high level Truth and Reconciliation Commission on mutual understanding to conduct investigation about those who were involved in gross violation of human rights at the time of the conflict and those who committed crime against humanity and to create the situation of reconciliation in the society.
- 5.2.6 Both parties vow to renounce all forms of war, attacks, counter-attacks, violence and counter violence existing in the country and commit to guarantee the democracy, peace and progressive changes in the Nepali society. It has been agreed that both parties shall help each other for maintaining peaceful situation.
- 5.2.7 Both parties guarantee to withdraw accusations, claims, complaints and under-consideration cases leveled against various individuals due to political reasons and immediately publicise the status of those imprisoned and immediately release them.
- 5.2.8 Both parties express the commitment to allow without any political prejudice the people displaced due to the armed conflict to return back voluntarily to their respective ancestral or former residence, reconstruct the infrastructure destroyed during the conflict and rehabilitate and socialise the displaced people into the society.
- 5.2.9 Both parties agree to take individual and collective responsibility of resolving, with the support of all the political parties, civil society and local institutions, any problems arising in the aforementioned context on the basis of mutual consensus and creating an atmosphere conducive for normalisation of mutual relations and for reconciliation.
- 5.2.10 Both parties express the commitment not to discriminate against or exert any kind of pressure on any member of the family of either side on the basis of them being related to one or the other side.
- 5.2.11 Both parties agree not to create any kind of obstacle and allow any kind of obstruction to be created in the independent travelling, assuming of duties and executing of work by the Government of Nepal and public bodies' employees and assist them in their work.

5.2.12 Both parties agree to allow unrestricted travelling as per the law within the state of Nepal to the personnel of the United Nations, international donors agencies and diplomatic missions working in Nepal, national and international non-government organisations, press, human rights activists, election observers and foreign visitors.

5.2.13 Both parties commit to operate publicity campaigns in a decent and respectable manner.

6. The end of war

6.1 On the basis of the historic agreement between the seven political parties and the Maoists on November 8th, giving permanency to the ongoing ceasefire between the government and the Maoists, we declare the end of the war that has been going on since 1996.

6.2 The decisions made by the meeting of the senior leaders of the seven political parties and the Maoists on November 8 will be the principal basis for the establishment of permanent peace.

6.3 After the Nepali Army is placed in the barracks and the Maoists' combatants are contained in the cantonments, possession of arms, display of arms, creating terror, use of weapons or such acts against the agreement or law will be punishable by the law.

6.4 The army on both sides shall not be allowed to campaign in favour of any group or shall not be allowed to express their support towards any of the sides but they shall not be deprived from their rights to vote.

7. Human rights, fundamental rights and following humanitarian laws

Both parties express their commitment towards universal declaration of human rights 1948 and international humanitarian law and basic principle and values of human rights.

7.1 Human Rights

7.1.1 Both parties reaffirm their commitment to respect and protect human rights and international humanitarian law and accept that no individual shall be discriminated on the basis of caste, gender, language, religion, age, ethnic

groups, national or social origin, property, disability, birth or any other status, thoughts or conscience.

7.1.2 Both parties have agreed to create an environment where the Nepali people can utilize their civic, political, economical, social and cultural rights and are committed to create an environment in which these rights will not be violated in the future under any circumstances.

7.1.3 Both parties express their commitment and state that necessary investigation will be undertaken against any individual involved in violating the rights mentioned in the agreement and action will be taken against ones that are found guilty. Both parties also ascertain that they will not protect impunity and along with it, the rights of the people affected by the conflict and torture and the families of the people who have been disappeared will be safeguarded.

7.1.4 Both parties shall not be involved in activities like torturing civilians, abducting, forcing them to work and shall take necessary action to discourage such activities.

7.1.5 On the basis of secularism, both the sides shall respect social, cultural and religious sensitivity, and shall respect the religious conscience of a religious place or an individual.

7.2 Right to live

7.2.1 Both parties shall respect and protect the right of an individual to live. No one shall be deprived of this basic right and no law including capital punishment shall be formulated.

7.3 Individual prestige, freedom and freedom of movement

7.3.1 Both parties shall respect the right of individual prestige and freedom. In this context, even the people who have been legally deprived from enjoying their freedom shall also not be subjected to torture or punished with inhumane behaviour or disrespectful behaviour. The right of privacy of an individual shall be protected legally.

7.3.2 Both parties, respecting the individual's freedom and right to security shall not place anyone under whimsical or illegal detention and shall not abduct or imprison any individual. Both parties shall release the details of the condition of the people who have been disappeared or have been kept captives and an agreement has also been reached to inform about their status to their family members, legal consultant or any other authorized person.

7.3.3 Both parties shall respect and protect the individual's freedom to move freely and right to choose a place to reside within the legal periphery and also expresses commitment to respect the right of the people who have been displaced to return home or to live in any other place they choose.

7.4 Civil and political rights

7.4.1 Both parties express their commitment to respect and protect an individual's freedom of opinion and expression, freedom to form unions and associations, freedom to assemble peacefully and shall work against exploitation.

7.4.2 Both parties shall respect the right of every individual to participate in public matters directly or through representatives, right to vote and be elected and the right of equality to enter public service.

7.4.3 Both parties are committed to respect the right of the people to be informed.

7.5 Socio-economic rights

7.5.1 Both parties are committed to respect and protect an individual's freedom to practice any profession.

7.5.2 Both parties are committed to respect and guarantee the people's right to food security. It also ascertains that the issues like food, food production, utilisation of food, its transportation and distribution shall not be interfered with.

7.5.3 Both parties accept the need to respect and protect the health rights of the people. Both parties shall not disrupt the supply of medicines, assistance

and health campaigns and also express its commitment towards treatment of the people who have been injured due to the conflict and shall also initiate rehabilitation process.

7.5.4 Both parties accept the need to respect and guarantee the right of education to all and express commitment to maintain adequate educational environment in educational institution. Both parties have agreed to ascertain that the right to education is not violated. An agreement has been reached whereby, incidents like capturing educational institution, using these institutions, abducting, detaining or disappearing teachers and students shall be stopped immediately and military barracks shall not be constructed near schools and hospitals.

7.5.5 Both parties have agreed not to illegally seize or capture anyone's private property.

7.5.6 Both parties believe in not disrupting the industrial environment of the country and to continue production, protect the right of group bargaining in industrial institution and respecting social security intends to encourage resolving the disputes between the labour and the industrial institution peacefully and respects the right to work determined by the International Labour Organisation (ILO).

7.6 Rights of women and children

7.6.1 Both parties completely agree on the need to specially protect the rights of women and children and the need to stop all forms of sexual exploitation and other forms of misbehaviour on women and child labour and other violent act against children and not to include children below the age of 18 in any form of military force. The children who have already been affected shall be rescued immediately and adequate provisions shall be made for their rehabilitation.

7.7. Right of Individual Liberty

7.7.1. Both parties agree to the freedom of opinion and expression; freedom to assemble peaceably and without arms; freedom of movement; freedom to practice any profession, or to carry on any occupation, industry or trade;

press and publication rights; the freedom to take part in peaceful political activities; the right of equality before the law; and to implement and have a tolerable system of justice implemented.

7.7. Right of Individual Liberty

7.7.1. Both parties agree to the freedom of opinion and expression; freedom to assemble peaceably and without arms; freedom of movement; freedom to practice any profession, or to carry on any occupation, industry or trade; press and publication rights; the freedom to take part in peaceful political activities; the right of equality before the law; and to implement and have a tolerable system of justice implemented.

8. Dispute Settlement and Implementation Mechanism

8.1. Both parties agree to become responsible and accountable in an individual and collective manner and not repeat in future mistakes committed in the past and also correct these mistakes on a gradual basis.

8.2. The National Peace and Rehabilitation Commission shall be set up as per the need for making the campaign for peace successful. The composition and working procedures of the Commission shall be as determined by the interim Council of Ministers.

8.3. Both parties are committed to settle all kinds of present or possible future mutual differences or problems through mutual talks, understanding, consensus and dialogue.

8.4. Both parties express commitment that the interim Council of Ministers shall constitute and determine the working procedures of the National Peace and Rehabilitation Commission, the Truth and Reconciliation Commission, the High-level State Restructuring Recommendation Commission and other mechanisms as per the need to implement this agreement, the Interim Constitution and all the decisions, agreements and understandings reached between the Seven-party Alliance, the Government of Nepal and the CPN (Maoist).

9. Implementation and Follow-up

Both parties have agreed to make the following arrangements for the implementation of the understandings mentioned in this agreement and for their follow-up –

- 9.1. Both parties agree to give continuity to the task of monitoring of the human rights provisions mentioned in this agreement by the United Nations Office of the High Commissioner for Human Rights, Nepal.
- 9.2. Both parties agree for the monitoring of the management of arms and the armies by the United Nations Mission in Nepal as mentioned in the five-point letter send to the UN earlier and in the present agreement.
- 9.3. Both parties agree to get the United Nations supervise the election to the Constituent Assembly.
- 9.4. The National Human Rights Commission shall also carry out works related to the monitoring of human rights as mentioned in this agreement together with the responsibility assigned to it as per the laws. In connection with carrying out its works, the Commission can take the help of national and international human rights organizations after maintaining necessary coordination with them.
- 9.5. Both parties agree to accept the reports submitted by the above-mentioned bodies, to provide the information requested by them, and to implement the suggestions and recommendations given by them on the basis of consensus and dialogue.

10. Miscellaneous

- 10.1. Both parties agree not to operate parallel or any form of structure in any areas of the state or government structure as per the letter of the decisions of November 8 and the spirit of the peace agreement.
- 10.2. Both parties accept to sign any complementary agreements, as necessitated, for the implementation of the present agreement.
- 10.3. This agreement can be revised any time with the consent of both parties. Both parties agree to provide to each other prior written information if they

wish to make any change. The amendments could be made to the agreement with the consent of both parties after receiving the information. The provisions to be made by such an amendment would not be below the minimum standards of the accepted international human rights and humanitarian laws.

- 10.4. If any disputes arise in any interpretation of this agreement, a joint mechanism comprising both parties shall make the interpretation on the basis of the preamble and the documents included in the schedule of this agreement, and this interpretation would be final.
- 10.5. The concept of 'two parties' as mentioned in this agreement would automatically cease to exist after the constitution of the Interim Legislature -Parliament. Thereafter, all the responsibility of implementing the obligations stated in this agreement shall be as per the arrangements made by the Interim Council of Ministers. It would be the duty and responsibility of all the political parties to extend cooperation in the compliance and implementation of the agreement.
- 10.6. We heartily appeal to one and all to extend cooperation for resolving their problems and demands through talks and dialogue and for holding the election to the constituent assembly and maintaining the law and order, at a time when the entire country is focused on the main campaign of the election of the Constituent Assembly.
- 10.7. We heartily appeal to the civil society, the professional groups, the class organisations, the media, the intellectual community and all the Nepali people to actively participate in this historic campaign of building a new Nepal and establishing lasting peace through the election of the Constituent Assembly by ending the armed conflict.
- 10.8. We heartily urge all the friendly countries and the United Nations, as well as the International Community to extend support to Nepal in this campaign of establishing full democracy and lasting peace.

Cognizant of the responsibility of the future of the country and the people, and becoming fully committed to this comprehensive peace agreement, we, on behalf of the Government of Nepal and the Communist Party of Nepal (Maoist), hereby make public this comprehensive peace agreement after signing it.

Prachanda

Chairman

Communist Party of

Nepal (Maoist)

Signed on November 21, 2006

Girija Prasad Koirala

Prime Minister

Government of Nepal

II. Water Security and Farmer Managed Irrigation Systems of Nepal

Ashok Raj Regmi¹

Introduction

Hydrologists have estimated a figure of 1,700 m³ per person per year as the national threshold that is required to meet water requirements for agriculture, industry, energy, and the environment. If availability is below 1000 m³ then a region is considered to be in a state of “water scarcity” and if below 500 m³, absolute scarcity (UNDP, 2006). With an estimated availability of 7,600 m³ per capita (4 x threshold) Nepal is relatively well endowed with water resources. Water availability, however, does not automatically translate into water security. The ability to use water and make it available at the right place, time, quantity and quality depends on a variety of additional factors such as institutional capabilities and economic environment. Nepal’s water resource consumption, for instance, is less than 10% of an estimated 207 km³ of water resource that is available annually (see also figure 1-1).² From the resource availability perspective there is plenty of water, yet there is a severe supply crisis in various water sectors such as drinking water, power generation, and irrigation. Abundant water at the macro-accounting level is of no use if it is not

¹ Research Associate, Workshop in Political Theory and Policy Analysis, Indiana University. Email: asregmi@indiana.edu

² Food and Agriculture Organization of the United Nations (FAO). *Aquastat Nepal*. FAO’s information system on water and agriculture. Land and water development division, Rome, 1999. <http://www.fao.org/ag/agl/aglw/aquastat/countries/nepal/index.stm>; International Commission on Irrigation and Drainage (ICID). *Sector Vision: Water for food and rural development - country position paper on Nepal*. ICID, 2000. http://www.icid.org/v_nepal.pdf

available at the local level. Institutional capability is, obviously, a more critical factor than resource availability in achieving water security in the case of Nepal. Drinking water supply in Kathmandu valley is severely stressed. The national water supply corporation is able to meet about 70% and 38% of Kathmandu's 210 million liters per day demand during the wet and dry seasons respectively.³

The power sector too, with its installed capacity of 609 MW, is unable to meet the existing demand supply gap, which is estimated to be growing at 50MW per year.⁴ This has resulted in six hours of load shedding each day, especially during the dry season. Performance in the irrigation sector is also disheartening. Year round irrigation is available to less than 20% of the 2.2 million hectares of land area that can potentially be irrigated.⁵ The outcomes of government efforts to develop these sectors have not at all been satisfactory. The failure of government agencies to deliver in most cases is due to poor institutional⁶ and not engineering design skills. Unless agencies are willing to recognize that local users under certain conditions are able to offer better institutional solutions and enforce rules at lower costs they run the risk of failing over and over again.

Ninety-six percent of water consumption is in the agricultural sector, followed by domestic use at 3% and industrial use at 1%.⁷ As populations increase, industries expand, rates of urbanization accelerate, and the irrigation sector continues to expand, one can expect competing claims and pressures to redistribute water. If water supplies are not allocated equitably among different users and uses, conflicts may arise. Some believe that the allocation problem can be tackled better by analyzing water use at the river basin level and by managing it on that scale. In this paper, I emphasize that water availability per

³ Shangraula, Bikash. "Water Supply dips with Daily Power Cuts." *Kathmandu Post*, Feb 5, 2007.

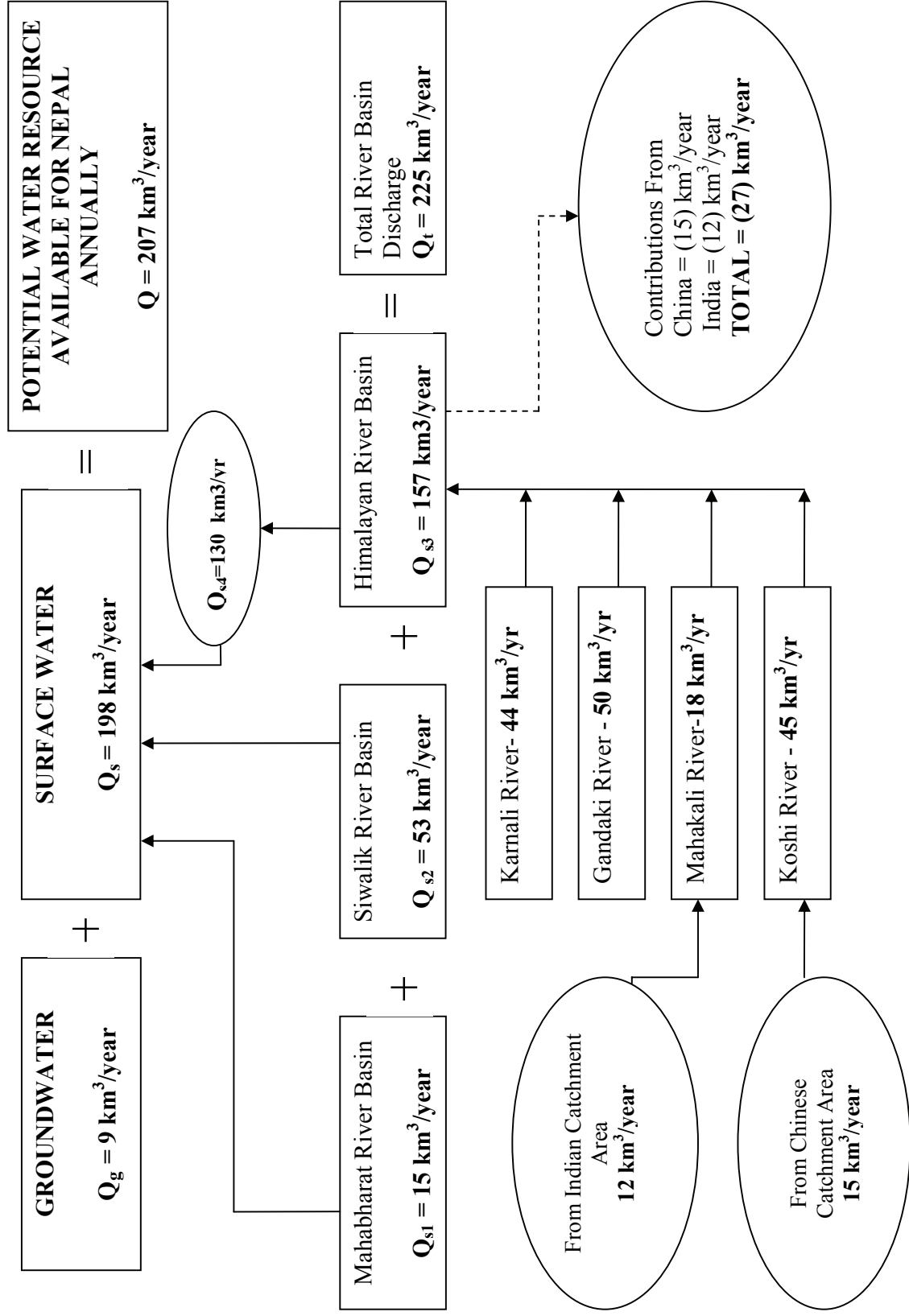
⁴ Dhakal, Sanjaya. "Whither Power Sector." *Spotlight Weekly*, Kathmandu: Vol. 23, No. 43, May 14-20, 2004.

⁵ Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

⁶ The use of the word institution in this paper connotes rules-in-use.

⁷ World Bank. *Environment at a Glance 2004 Nepal*. Environment Department, World Bank. Washington D.C., 2004

Fig 1-1 ANNUAL AVAILABLE WATER RESOURCE/NEPAL



Source: Based on FAO 1999 and ICID 2000

se is not the critical factor that leads to conflicts or enhances water security. It is the way water resources are governed and managed that causes conflicts. Therefore, to enhance water security or minimize water scarcity emphasis has to be placed on creating institutional environments that encourage and support the governing capacities of local resource users.

One of the key objectives of this paper is to underscore the idea that local user groups, under certain conditions,⁸ are able to self-organize and successfully govern their natural resources. Successful self-organized groups are not only able to craft optimal rules and enforce them at low costs but in many instances are also able to out-perform centrally governed resource systems. I draw on examples from the irrigation sector⁹ to show that farmer managed irrigation systems (FMIS) are consistently better at delivering water to their tail ends, maintaining their infrastructures, and realizing greater agricultural productivities than agency managed irrigation systems (AMIS). Farmers in FMIS are, therefore, able to ensure better water security to their members than their counterparts in AMIS.

FMIS potential is substantial but not every FMIS is successful. There are some settings where appropriators are able to self-organize and other settings where they are not. Since there are many variables that can affect the benefits and costs of organizing, there are also many points of external intervention that can either enhance or reduce the chance of self-organization.¹⁰ The paper, in some

⁸ Though researchers are not able to definitely determine under what set of conditions appropriators will self-organize, there is, however, consensus on the set of resource and resource user attributes that will enhance cooperation. The resource attributes are scope of feasible improvement, availability of reliable indicators of the resource condition, relative predictability of the flow of resource units, and the ability to learn and understand the dynamic patterns of the resource stock and flow. Resource user attributes conducive to self organization are salience, common understanding, low discount rate, trust and reciprocity, autonomy and prior organizational experience. See, Ostrom Elinor. *Context and Collective Action: Four Interactive Building Blocks For a Family of Explanatory Theories*. Workshop In political Theory and policy Analysis, Indiana University. 1999.

⁹ Quantitative analyses reported in this study are primarily based on the Nepal Irrigation and Systems (NIIS) database maintained at the Workshop in Political Theory and Policy Analysis, Indiana University. The NIIS database has information on 231 irrigation systems from Nepal.

¹⁰ Ostrom, Elinor. "Reformulating the Commons." In: Burger, J., Ostrom, E., Norgaard, R., Policansky, D., and Goldstein, B. (Eds.) *Protecting the Commons: A Framework for Resource Management in the Americas*. Island Press, Washington, D.C., Chapter 1, 2001.

detail, examines how various variables affect irrigation performance, how resource settings influence cooperation and conflicts, which conditions are conducive to self-organization, and what conditions can threaten the abilities of communities to organize. An understanding of how different variables interact in different settings allows for the design of policies that can strengthen institutional and governance capabilities of FMIS. Irrigation is important in Nepal. Agriculture contributes 38% to the GDP and provides employment to 75% of its labor force.¹¹ If external assistance can help farmers self-organize and develop their own institutions, there is great potential for improving irrigation performance, enhancing water security, and improving prospects for food security.

The paper is organized in the following manner. First, I provide a brief overview of the irrigation sector and its performance in Nepal. Second, I explore the incentive structures facing farmers in self-organized and in agency-managed systems to assess why farmers in the former system tend to be better motivated than those in the latter. Then, after reviewing the organization and governance structure of Farmer Managed Irrigation Systems (FMIS), I compare its performance with Agency Managed Irrigation Systems (AMIS). I then explore how resource settings may affect cooperation and conflict in self-organized systems before making policy recommendations on how performance can be improved in irrigation systems

Irrigation Development and Planning in Nepal

The country has a total cultivated area of 2.6 million hectares. Though 85% of this area has potential for irrigated agriculture, only 1.1 million hectares is covered by irrigation infrastructure.¹² Surface-water is used to irrigate 900,000 ha

¹¹ Ministry of Finance (MOF). *Economic Survey*. Kathmandu: Government of Nepal, 2006.

¹² Nepal National Committee of International Commission on Irrigation and Drainage (NENCID).

Country Position Paper Nepal. <http://www.icid.org/> accessed Jan, 2007; Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

and ground-water¹³ 200,000 ha of land area. Round the year irrigation is available to only 38% of the irrigated areas. Most (75%) of the irrigated areas are serviced by farmer managed irrigation systems and the remaining (25%) by agency managed irrigation systems.¹⁴

A vast majority of the irrigation infrastructure developed until the mid 1950s was constructed and managed by farmers. During this period there was some state involvement (Chandra Nahar and Juddha Nahar¹⁵ and a few "Raj Kulos"¹⁶) but it was marginal.¹⁷ Even today, farmer managed irrigation systems contribute three times more toward irrigated agriculture than agency managed irrigation systems. It was only after 1956 that planned modes of irrigation development were initiated by the government through its five year plans.

Irrigation infrastructure development from 1956-1980 initially focused on the construction of medium and large scale projects. It then gradually moved toward the intensification of existing command areas through the expansion and rehabilitation of existing infrastructure. Program implementation during this period was very centralized. Irrigation officials assumed all planning, construction, operation and management, and maintenance responsibilities. Beneficiaries were not involved. Only after 1985 did the Government begin to take a more integrated approach to developing land and water resources and, unlike earlier times, more emphasis began to be placed on user involvement in the irrigation process.¹⁸

¹³ Ground-water is used for irrigation mainly in the Terai.

¹⁴ Nepal National Committee of International Commission on Irrigation and Drainage (NENCID).

Country Position Paper Nepal. <http://www.icid.org/> accessed Jan, 2007; Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

¹⁵ Chandra Nahar was the first public sector irrigation project undertaken by the National Government in 1923. The Juddha Nahar was built in Rautahat district in the Terai in 1946.

¹⁶ State budgets were allocated to construct and operate the "Raj Kulos" or royal canals. Regmi (1978) calls them state operated irrigation canals.

¹⁷ Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

¹⁸ *Ibid*; Angood, C., Chancellor, F., Hasnip, Morrison, N., Smith, J. *Contribution of Irrigation to Sustaining Rural Livelihoods: Nepal Case Study*. KAR Project 7879. HR Wallingford, DFID, 2002.

The policy reforms undertaken by the government to adopt a participatory approach to irrigation development are reflected in documents such as the Water Resources Act 1992, and the updated Irrigation Policy 2003. The policy sets out objectives and guidelines for irrigation interventions including FMIS development and management and transfer of Department of Irrigation (DOI) constructed systems to water user associations (WUA).¹⁹ The irrigation policy which was initially adopted in 1992 has explicit provisions for supporting community efforts in irrigation development and encouraging more users' participation in agency-led irrigation development programs. The Water Resources Act 1992 also provides a legal basis for implementing participatory development programs as it recognizes the rights of WUAs. Another important document is the Government's 20-year Agricultural Perspective Plan (APP). Irrigation is identified as the primary input to increasing agriculture productivity and FMIS are recognized as key vehicles to deliver the inputs.

Irrigation Performance

An estimated \$1.2 billion has been spent in the irrigation sector from 1956-2000.²⁰ Only 20% of this amount was funded through the Government's own resources. The remaining 80% in investments has been funded by external donors²¹ Nearly 60% of these funds have been spent on constructing new irrigation infrastructure. Despite a standing policy since the mid eighties to prioritize the rehabilitation and expansion of FMIS networks, the DOI has invested only about 16% in this area.²²

DOI investments in medium and large scale projects have been disappointing. Shah and Singh (2001) report that water volumes supplied by many large

¹⁹ Water Aid Nepal. *Water Laws in Nepal: Laws Relating to Drinking Water, Sanitation, Irrigation, Hydropower and Water Pollution*. Water Aid Nepal, Lalitpur, Nepal, 2005.

²⁰ Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

²¹ The Asian Development Bank, World Bank and the Saudi Development Fund account for 60% of the investment and bilateral donors 20%.

²² Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

projects²³ are far below original plans and they consistently have capital cost over-runs. Some projects such as Bagmati and Babai are reported to have cost over \$5000 per hectare to construct. The 1994 appraisal by the National Planning Commission's regarding irrigation development performance in the country was also negative. It reported that "irrigation development and operation in Nepal is performing dismally relative to the amount of resources poured into the sector."²⁴ There are many reasons for such poor performance but the ones that are more frequently reported are: a) weak governance framework and enforcement in attaining effective service delivery; b) unrealistic productivity projections in assessing benefit-cost ratios; c) poor system management; d) insufficient operation and management due to lack of user participation; and e) poor understanding of farmer priorities.²⁵ The institutional arrangements to induce realistic project planning and effective system management are, obviously, weak.

Intervention by government agencies to improve farmer managed irrigation systems have also run into difficulties. Ostrom²⁶ points out that these difficulties often arise because irrigation agencies fail to recognize the institutional aspect of irrigation systems and focus only on improving physical capital. To emphasize her point she cites the experience of the USAID funded Chiregad Irrigation Project in Dang as reported by Hilton.²⁷ A new irrigation system with permanent headworks and cement-lined canals was constructed in an area that was previously irrigated by a network of five farmer managed irrigation systems. Making no efforts to understand how the pre-existing water

²³ Large irrigation projects such as Sunsari-Morang, Bagmati, Bhairawa-Lumbini Groundwater, Narayani etc.

²⁴ National Planning Commission (NPC). *Irrigation Development in Retrospect: Search for a breakthrough*. National Planning Commission, Kathmandu, 1994.

²⁵ Asian Development Bank (ADB). *Technical Assistance to the Kingdom of Nepal for Preparing Community Managed Irrigation Sector Project in Central and Eastern Basins*. TAR NEP:33209, ADB, Manila, 2001.

²⁶ Ostrom, Elinor. "The Challenge of Underperformance." In: Shivakoti, Ganesh P., Ostrom, E. (Eds.), *Improving Irrigation Governance and Management in Nepal*. ICS Press, Oakland, CA, 2002.

²⁷ Hilton, Rita. "Institutional Incentives for Resource Mobilization in Farmer-Managed and Agency-Managed Irrigation Systems." In: Shivakoti, Ganesh P., Ostrom, E. (Eds.), *Improving Irrigation Governance and Management in Nepal*. ICS Press, Oakland, CA, 2002.

associations were organized, the DOI appointed a new user committee. This committee, however, did not even include the water managers of the earlier five FMIS. The outcome of this intervention was that only three of the five “maujas” received water consistently. Prior to the intervention, all five “maujas” used to receive adequate water. The effort to improve agricultural productivity through investments in physical capital alone thus resulted in reduction of the service area, unreliable water deliveries, non functional WUA, and a weakened older WUA. Institutional structures stand on social capital developed over many years of learning through shared experiences and are as tangible as physical capital. Their neglect, as we see in this example, not only resulted in a weakening of farmer organizations but also led to opposite outcomes.

Farmer Motivation in Self-Organized versus Agency-Managed Systems

A self-organized system can be structurally superior in generating positive incentives than externally organized systems. In a self-organized system such as the FMIS it is the farmers themselves who act collectively to construct and govern their systems. They make decisions on delineating service areas, determining water allocation rules and assigning maintenance responsibilities. However, in externally designed systems such as the AMIS, it is someone other than the farmers who design the physical system and assume responsibility for making rules and enforcing them. Government officials who are tasked with managing these systems, however, have to govern on shoe string budgets and with limited manpower. Without much incentive to develop long-term working relationships with the farmers and faced with resource constraints many try to develop simple uniform allocation rules across the board and often neglect to enforce rules. Given the farmers’ diverse cropping schedules and needs, such uniform rules are mostly inadequate and without enforcement the stage is set

for breaking rules. When “official rules” do not match local needs then conflicts break out, canals are breached, and physical capital is destroyed.²⁸

In more recent times, irrigation policy does encourage “turnover” and “joint management” of AMIS to formal water user groups to overcome perverse incentives. However, very little attention tends to be paid in forming these groups and they are often seen as arrangements to obtain a community’s cooperation. Little is done to either encourage or develop the governing function of these organizations. Officials (professional engineers) who oversee this process are not motivated²⁹ and often not skilled³⁰ to serve the needs of the farmers. The farmers too are not confident about the transfer process and are unwilling to invest their time in operating the system. Incentives to shirk on the part of the officials and incentives to free-ride on the part of the farmers often result in the poor performance of AMIS.

Farmers in successful self-organized systems tend to overcome their collective action problems by crafting their own rules. However, the conditions that are necessary to initiate collective action do not arise spontaneously. Unless farmers have a common shared understanding of the costs and benefits of engaging in collective action, unless a secure property regime makes it possible for them to reap the benefits of their efforts in the long run, and unless they are confident that external authorities will not interfere in their rule-making, rule following and rule-enforcement activities, farmers will not invest their efforts in organizing for the long term. Simply turning over systems to the farmers and expecting viable organizations to take root is expecting too much. To craft rules that suit a particular environment there has to be an understanding of the interrelationships between the combination of rules with the physical, social, and cultural environment.

²⁸ Lam, Wai Fung. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. ICS Press, Oakland, CA, 1998; Shivakoti, Ganesh P and Elinor Ostrom. *Improving Irrigation Governance and Management in Nepal*. Oakland, CA: ICS Press, 2002.

²⁹ Engineers do not regard the O&M operation highly. They are much more interested in the construction part of the process. Also promotions in the civil service are based on seniority which to a large extent discourages initiative and creativity. Promotions and transfers are strongly associated with political patronage and not to keeping an irrigation system in good condition.

³⁰ Institutional aspects of irrigation system design are often not a strong component of engineering training.

Governing Farmer Managed Irrigation Systems

An irrigation system can be conceptualized as a common-pool-resource. Withdrawal of water from the system means that there is less water available for others to use, and once a system is constructed, farmers who own land adjacent to the watercourse can potentially access water even if they have not contributed toward its provision. Farmers sharing an irrigation system have to cope with the problems of provisioning and appropriation. Unless non-contributors can be excluded from enjoying the benefits of a common system no rational actor would be willing to contribute toward its development and upkeep. Also, unless there are rules constraining resource use, each user would want to maximize consumption. We see, however, that many farmer managed irrigation systems are able to resolve such cooperation dilemmas by creating effective agreements amongst themselves. I draw on my own research³¹ and Shukla et al's³² work on the irrigation resource inventory of Chitwan to describe the structure of FMIS and how they operate.

Irrigation Infrastructure

The key FMIS irrigation infrastructures consist mainly of headworks, canals and structures for water distribution. The headwork of an FMIS typically consists of an intake structure to divert water and a gated structure to control water flow. The intake diverts water from the natural water course into a constructed canal. These intakes are mostly temporary structures constructed from stone and brushwood. Uses of semi-permanent gabion box structures have also been observed. The gated structures for flood control are usually observed in systems that have received external assistance. Systems that do not have

³¹ Regmi, Ashok R. "The Role of Group Heterogeneity in Collective Action. A Look at the Intertie between Irrigation and Forests. Case Studies from Chitwan, Nepal." (Ph.D. diss., Indiana University, Bloomington, IN, 2007);

³² Shukla, A., Gajurel, K., Shivakoti, G., Poudel, R., Pandit, K., Adhikari, K., Thapa, T., Shakya, S., Yadav, D., Joshi, N., Shrestha, A. *Irrigation Resource Inventory of East Chitwan*. Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal, 1993.

gates are forced to breach their diversion structures when threatened by flood waters.

Systems consist of a main canal and a number of branch canals. The majority of systems in East Chitwan have fewer than six branch canals where mean canal lengths (sum of the main and branch canals) are less than 6200 meters. Most of the branch canals are unlined and the main canals partially cement-lined. The mean service area and households served by a typical FMIS is 124 hectares and 139 households respectively.

Quite a few systems have the cement concrete proportional weirs for dividing water shares. Most rely on piped outlets and other temporary structures. Systems without permanent water allocation structures use wooden stakes, bushes, stone and earthen materials across the main canal to ensure proportional allocation of water.

Water Sharing Arrangements

Allocation of water in a system reflects entitlements. Water is allocated only to those farmers or farmlands who have water rights and not to others. Allocation also means the quantitative division of water in the system among the entitled farmers or fields. The principle on which water is shared is decided by the irrigator community and can take a number of forms.³³ The most common allocation principle observed in Chitwan is the principle of dividing water in proportion to the land owned by the farmer. There are other principles too, for instance, the apportioning of water based on the paddy cultivation task³⁴ and on water shares.³⁵

³³ Pradhan, Prachanda. *Patterns of Irrigation Organization in Nepal. A Comparative Study of 21 Farmer Managed Irrigation Systems*. Country paper No. 1, IIMI, Colombo, Sri Lanka, 1989.

³⁴ The task of paddy cultivation can be divided into two periods a) transplantation period and b) post transplantation period. During the first period water is required for preparing the seedbeds and preparing land for transplantation. During this period farmers can agree to meet the water needs of all the users irrespective of entitlements. In the post-transplantation period, however, water distribution is based on entitlements.

³⁵ The total water supply in a system is divided into a fixed number of shares which is then apportioned to farmers based on their initial contributions toward system construction.

Distribution of water among farmers is the implementation of the allocation principle. It involves implementing a set of agreed upon rules with the help of some physical structures. Depending upon their system characteristics, water users are known to use a variety of methods to distribute water e.g. free flow, timed rotation, time-area relationship, and time required to wet/saturate a given unit of land. The most popular method of distributing water during stressful periods is timed rotation.³⁶ Water user associations decide the time and duration each farmer is allowed to irrigate his/her field.

Maintenance and Resource Mobilization

WUAs are organized for regular as well as emergency repairs. The regular maintenance activities include the de-silting of the major branch canals, repair of intake structures, and the strengthening of canal dikes. These activities are undertaken prior to the rice planting season i.e. in March for the spring rice season and May for the monsoon rice season. Emergency maintenance typically involves repairs of the diversion structure and main canal embankments that get washed away by floods. In addition to the one-off bi-annual maintenance activities, farmers are also organized for continuous maintenance during the monsoon season. Either association members themselves or hired helpers regularly monitor the canals for early detection of canal breaches.

Cash as well as labor resources are mobilized internally to carry out repairs of intake structures and the de-silting of canals. While landholding is the basis for cash contributions, households are the basis for mobilizing labor resources. In an emergency all members are mobilized regardless of benefits or entitlements.

³⁶ Depending on the water availability and area entitled to be irrigated, associations decide the time duration per branch canals before they rotate turns. For instance, there are four branch canals in the Baireni/Pakhdibas irrigation system, which rotate turns after 24, 36, 17, and 51 hours respectively. All of the water in the system is supplied to the first branch for the first 24 hours before it is diverted to the second branch for 36 hours, and so on. The fields in each branch then divide up the water among themselves based on a prior agreed allocation principle. There is quite a variation in waiting times. Farmers in some systems may get their turn every 8 hours and in other systems every six days.

Organization

All irrigation systems in Chitwan have WUAs. However, some may not be formally registered and may also not have written constitutions. Association memberships are mostly based on ownership of land in the service area. Executive officers headed by a chairperson are selected from among the members. Officials are tasked with mobilizing resources for maintenance, organizing and supervising system work, maintaining records and accounts, and resolving conflicts. Although WUA officials are permitted to take routine decisions the major ones need consensus from a general assembly. All members make compulsory contributions towards the upkeep of systems either through labor or cash contributions.

Rules are used extensively to structure irrigation activities. All systems have explicit and commonly understood rules and regulations relating to the allocation and distribution of water, contribution of resources for repair and maintenance, and sanctions for violating rules. Sanctions can take any of the following forms: a) verbal warning without monetary fines; b) monetary fines; c) cessation of water turn; and d) removal from the association. Sanctions are imposed by water user functionaries, guards, or fellow appropriators depending on the nature of the sanction imposed. About 60% of the systems in Chitwan have written rules and regulations. Many of the systems managed by the indigenous people (Tharu) do not have formally written rules, yet rule-following is reported to be higher in these systems than in others.³⁷

Comparing FMIS and AMIS Performance

There are many individual case study reports by authors who assert that FMIS in Nepal perform better than AMIS. Lam,³⁸ who undertook a systematic and comprehensive study of 127 Nepali irrigation systems, also reaches the same

³⁷ Shukla, A., Gajurel, K., Shivakoti, G., Poudel, R., Pandit, K., Adhikari, K., Thapa, T., Shakya, S., Yadav, D., Joshi, N., Shrestha, A. *Irrigation Resource Inventory of East Chitwan*. Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal, 1993.

³⁸ Lam, Wai Fung. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. ICS Press, Oakland, CA, 1998.

conclusion. In the following sections I review his results and those of a few others to underscore Ostrom's idea³⁹ that self-organized resource users may be better able to resolve cooperation dilemmas (or be a major part in the resolution) when resources are local in scale. In other words, external actors may face more difficulties than local resource users in designing optimal institutional solutions and enforcing rules at lower costs.

Lam uses three measures of irrigation performance – Agricultural Productivity,⁴⁰ Water Delivery,⁴¹ and Physical Condition⁴² – to compare performances between FMIS and AMIS. All of his measures are composite indices that consist of multiple variables. Agricultural productivity attempts to capture the productive potential of a group resulting from their collective action efforts. Water delivery measures the ability of a system to deliver water adequately, reliably, and equitably. And, the variable physical condition is a measure of how well an irrigation system is being maintained. Comparing FMIS and AMIS along each of these three dimensions he finds that FMIS on average have higher levels of agricultural productivity, maintain their infrastructures better, and deliver water more effectively than AMIS. These differences are statistically significant at the .01 level (Table 1.1).

³⁹ Ostrom, Elinor. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press, 1990.

⁴⁰ Agriculture Productivity consists of three variables viz. agricultural yield measured in metric tons per hectare per year, cropping intensity at head-end, and cropping intensity at tail-end. One crop per year on a plot of land equals a cropping intensity of 100%, two crops mean 200%, and three crops mean 300%.

⁴¹ Water Delivery includes three variables i.e. water adequacy, equity and reliability. Water adequacy refers to whether a system is able to make enough water to meet farmer needs. Equity refers to fairness in distributing water between head and tail end. Reliability refers to the predictability and timeliness of water delivery.

⁴² Physical condition reflects the collective maintenance efforts as well as the degree of social organization of the group. It comprises two variables viz. condition of infrastructure and the degree of perceived economic efficiency in maintaining the infrastructure.

Table 1.1⁴³ Performance by type of governance arrangement

	FMIS (N=70)	AMIS (N=19)	F	p
Physical Condition	3.73	2.75	40.76	.00
Water Delivery	3.73	2.65	38.02	.00
Agricultural Productivity	4.36	3.40	17.25	.00

Source: Adapted from Lam (1998)

Two other relevant results that he reports in his study are that rule following among appropriators is significantly greater in FMIS than AMIS, and levels of mutual trust are higher in FMIS than in AMIS. More than 50% of the FMIS are characterized by high levels of rule following, whereas this is only 20% in the case of AMIS; rule infractions in 9 out of 10 FMIS systems are of a minor nature compared to 1 in 2 in AMIS; and farmers trust fellow farmers nearly twice as much in FMIS than AMIS. The reason why FMIS are able to perform better than AMIS is probably because the rules adopted by the former are better able to distribute the benefits and costs more equitably among the users than the latter. This is reflected in the higher levels of trust and greater rule-following behavior observed in FMIS than in AMIS.

Water is generally most abundant in river courses during the monsoon season. In the spring and winter seasons, however, it tends to be scarcer. Water is the most critical agricultural input for Nepali farmlands and crop yields and cropping intensities are mostly a function of its availability. Therefore, the ability of irrigation systems to deliver water to their tail ends across the seasons is a strong indicator of irrigation performance. Comparing FMIS and AMIS on this measure Ostrom and Gardner⁴⁴ find that FMIS consistently outperform

⁴³ The values reported for each of the dimensions are factor scores and do not have a unit of measure. These scores can, however, be used relatively to make comparisons.

⁴⁴ Ostrom, Elinor, Gardner, Roy. "Coping with Asymmetries in the Commons: Self-Governing Irrigation Systems Can Work." *Journal of Economic Perspectives* 7(4): 93-112, 1993.

AMIS across the seasons, more so in the scarcer seasons, in their ability to provide abundant water to their tail ends (see Table 1.2).

Table 1.2 *Water abundance by type of governance arrangement and season*

Season of Year	FMIS	AMIS	FMIS	AMIS
	Abundant Water at the Head End		Abundant Water at Tail end	
	% (N)	% (N)	% (N)	% (N)
Monsoon	97 (100)	91 (23)	88 (100)	44 (23)
Winter	47 (99)	43 (23)	38 (98)	13 (23)
Spring	34 (98)	26 (23)	24 (96)	9 (23)

Source: E. Ostrom and Gardner (1993: 103)

Table 1.2 shows that twice the number of FMIS are able to deliver abundant waters to their tail ends than AMIS. During the scarcer seasons, in winter and spring, three times more FMIS than AMIS accomplish this task. There is abundant water at the head ends of more FMIS than AMIS even in the summer season; however, the differences are not as striking as in the water scarce seasons.

Studies of 160 FMIS in Tanahu by Poudel et al⁴⁵ and 88 FMIS in Chitwan by Shukla et al⁴⁶ also indicate that FMIS are able to produce more spring paddy (4 mt/ha/yr and 4.6 mt/ha/yr) than the national average (2.28 mt/ha/yr).

The above results indicate that farmers in self-organized irrigation systems are capable of performing better than their counterparts in systems that are managed by external actors. This, however, does not mean that farmers are always successful at self organization. There is general agreement that appropriators who are dependent on a resource, intend to use their resources over a long period of time, have achieved certain levels of trust, and possess some level of autonomy to make their own rules are more likely to self-organize. Whether they are actually able to do so, however, depends on how attributes of the resource and attributes of the resource users interact in specific field settings to affect the perceived costs and benefits of organizing.⁴⁷ In the following sections, I examine how some of the resource user attributes and resource attributes may influence the performance of FMIS in specific resource settings.

Farmer Managed Irrigation Systems in Chitwan

In this section I draw heavily on my study⁴⁸ of 74 farmer managed irrigation systems from Chitwan, Nepal. In Chitwan, there are two distinct types of river systems; north-south flowing rivers and east-west flowing rivers. Rivers that flow north-south originate from the Mahabharat hills and pass through changing terrain from hills to plains. These rivers are characterized by steep

⁴⁵ Poudel, Rabi, Pandit, K., Adhikari, K., Shakya, S., Yadav, D., Joshi, N. *Inventory and Need Assessment of Irrigation Systems in North-East Tanahu (Volume-I)*. A report prepared for International Irrigation Management Institute (IIMI) by Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Chitwan, Rampur, Nepal, 1994.

⁴⁶ Shukla, A., Gajurel, K., Shivakoti, G., Poudel, R., Pandit, K., Adhikari, K., Thapa, T., Shakya, S., Yadav, D., Joshi, N., Shrestha, A. *Irrigation Resource Inventory of East Chitwan*. Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal, 1993.

⁴⁷ Ostrom Elinor. *Self-Governance and Forest Resources*. Center for International Forestry Research, 1999

⁴⁸ Regmi, Ashok R. "The Role of Group Heterogeneity in Collective Action. A Look at the Intertie between Irrigation and Forests. Case Studies from Chitwan, Nepal." (Ph.D. diss., Indiana University, Bloomington, IN, 2007)

gradients, seasonal flows, changing river course, low discharge volumes, and difficult terrain. Irrigation systems drawing water from these rivers tend to have longer canals, pass through landslide zones, and require frequent maintenance of diversion structures. East-west rivers, on the other hand, are characterized by flat terrain, mild gradients, perennial flows, and high discharge volumes. Irrigation systems on these rivers enjoy an advantage over the other systems in terms of the ease with which appropriators can access resource units. The north-south and east-west groupings reflect distinct resource settings. Apart from this, system variations can also occur with respect to group size, ethnic compositions, exit options, in-group income differences and many other variables. It is within such a context that local resource users have to organize and craft rules that allow them to maintain their resources as well as ensure equitable resource distribution.

Factors that Influence FMIS Performance

One of the key results of my analysis indicates that performance of an FMIS in Chitwan is strongly associated with the orientation of the river system from which it draws its waters. As pointed out in the earlier paragraph, the characteristics of a river system have a direct bearing on the amount of efforts required to operate and maintain a system and the volume of resource units available to it. This is reflected in the ability of E-W irrigation systems to access water for more number of months in a year (Table 1-3), maintain their infrastructures better (Table 1-4), and enjoy higher cropping intensities (Table 1-5).

Table 1-3 Relationships between Average Access to Water and Orientation

	Systems on East-West Running Rivers	Systems on North- South running Rivers
Access to water less than 9 months/yr	0 (0%)	35 (76%)
Access to water greater than 9 months/yr	25 (100%)	11 (24%)
TOTAL	25	46
	100%	100%
Chi2 = 37.52, p = 0.000		

Table 1-4 Relationships between Orientation and Performance Measures

	N	Systems on East - West Running Rivers (N=22)	Systems on North- South Running Rivers (N=43)	F	P
Physical Condition	65	4.33	3.67	43.43	0.00
Productivity	65	5.38	4.29	44.57	0.00

Table 1-5 Orientation and Cropping Intensities

	East-West Systems	North- South Systems	F	P
Cropping Intensities at Head End	297 % (22)	245% (43)	39.9	0.000
Cropping Intensities at Tail End	275 % (22)	212 (42)	33.2	0.000

Whereas all E-W irrigation systems have access to water for more than 9 months, this is true for only 1 out of 4 N-S systems (Table 1-3). Not only is agricultural productivity significantly better in E-W systems than N-S systems (5.38 vs. 4.29; $p=0.00$) but so is the physical condition of irrigation infrastructure (4.33 vs. 3.67; $p=0.00$). This suggests that the average irrigation system located on E-W running rivers is more productive and also better maintained than an average system on N-S running rivers (Table 1-4). Evidence of higher productivity can also be seen in Table 1-5. Cropping intensities at both the head as well as tail ends are significantly higher in E-W systems than in N-S systems. This implies that land area located at the head ends of irrigation systems tend to be more productive than those at the tail ends irrespective of the orientation of the system, and E-W systems in general are more productive than N-S systems.

I find that irrigation systems located on N-S flowing rivers exhibit significantly higher levels of rule-following behavior compared to their counterparts in the E-W Rivers (Table 1-6). However, I do not find significant differences in the monitoring and sanctioning activities (Table 1-7) and in the levels of rule infractions between the N-S and E-W groups (Table 1-8). The results suggest that less endowed resource systems (N-S) tend to be more conscious about following operational rules than the better endowed systems. But, in terms of monitoring and enforcing rules, they tend to be more or less similar. The nature of rule infractions in both cases also tends to be mostly of a minor nature such

as shirking “banwari”⁴⁹ duties or not showing up on time. It would be unusual to find irrigators stealing water or irrigating out of turn.

Table 1-6 Relationships between Rule Following Practices and Orientation

	Systems on East–West Running Rivers	Systems on North– South Running Rivers
Low/Moderate level of rule following	8 (42%)	8 (20%)
High level of rule following	11 (58%)	32 (80%)
TOTAL	19	40
	100%	100%
Chi2 = 3.185, p = 0.074		

Table 1-7 Relationship between Monitoring/Sanctioning and Orientation

	Systems on East–West Running Rivers	Systems on North– South Running Rivers
Low/Moderate Monitoring and Sanctioning Activities	5 (42%)	13 (37%)
High Monitoring and Sanctioning Activities	12 (58%)	22 (63%)
	17	35

⁴⁹ “Banwari” is a practice whereby each household has to contribute one able bodied person as labor contribution toward irrigation system maintenance.

TOTAL	100%	100%
Chi ² = 0.057, p= 0.811		

Table 1-8 Relationship between Level of Infractions and Orientation

	Systems on East–West Running Rivers	Systems on North– South Running Rivers
Minor Infractions	15 (83%)	34 (97%)
Major Infractions	3 (17%)	1 (3%)
TOTAL	18	35
	100%	100%
Yate's Chi ² = 1.57, p = 0.21		

Rules are used extensively to structure irrigation activities. All of the surveyed systems have water users associations, and rules govern the allocation and distribution of water, resource mobilization, and monitoring and sanctioning. There is also a common understanding among users regarding the principles of water entitlements, resource contributions, and fines for rule violations. The rules in use, however, vary from system to system as they are designed to cope with their own situations.

Two other factors that significantly influence irrigation performance are the willingness of individuals in groups to assume leadership or entrepreneurial activities, and the group's history of prior organizational experiences. Whereas only 1 out of 5 E-W systems lack leadership activities, nearly 3 out of 5 do so in N-S systems (Table 1-9). The differences in leadership activities also associate positively and significantly with performance variables (Table 1-10). This

pattern is similar in the case of prior organizational experience (Tables 1-11, and 1-12). Whereas more than 8 out of 10 E-W systems have a history of cooperation in activities other than irrigation, only 3 out of 10 N-S systems have such a history. Prior history of cooperation is also positively and significantly associated with performance (Table 1-12).

Table 1-9 Relationships between Leadership Activities and Orientation

	Systems on East-West Running Rivers	Systems on North- South Running Rivers
No leadership activities	3 (18%)	24 (60%)
Presence of some level of such activities	14 (72%)	16 (40%)
TOTAL	17	40
	100%	100%
Chi2 = 8.58, p = 0.003		

Table 1-10 Relationships between Leadership Activities and Performance

	No leadership activities (N=26)	Presence of some level of such activities (N=28)	F	P
Physical Condition	3.74	4.13	14.13	0.00
Productivity	4.37	5.06	14.85	0.00

Table 1-11 Relationships between Cooperation in other Activities besides Irrigation and Orientation

	Systems on East-West Running Rivers	Systems on North-South Running Rivers
No cooperation	3 (16%)	29 (69%)
Some cooperation	16 (84%)	13 (31%)
TOTAL	19	42
	100%	100%
Chi2 = 14.87, p = 0.000		

Table 1-12 Relationships between Cooperation in Other Activities besides Irrigation and Performance

	No cooperation (N = 30)	Some cooperation (N = 26)	F	P
Physical Condition	3.76	4.05	5.72	0.02
Productivity	4.45	4.91	5.01	0.03

The results confirm that leadership abilities and prior organizational experience matter and that they significantly influence irrigation performance. Unless individuals are willing to invest substantial amounts of their personal time and energy to coordinate activities of the many users it may not be possible to craft workable institutions. Making, testing, fine tuning, interpreting, and monitoring and enforcing rules to structure irrigation activities is a continuous

process and it requires substantial amounts time and energy. Ternstorm⁵⁰ also finds a significant relationship between leadership abilities and performance in her study of irrigation systems. Prior organizational history also appears to be an important variable that influences performance. The reason why groups with a prior history of working together in other activities tend to also do well in governing their irrigation resources is because familiarity with various rules and strategies, used to achieve various forms of regulations, make the task of organization a bit easier as users are more likely to agree upon rules whose operation they understand from prior experience.

Heterogeneity and FMIS Performance

I find that the socio-cultural differences, as reflected by a group's ethnic composition, are not correlated negatively with irrigation performance. Performance, rather, is correlated negatively with income variation. The results suggest that variations in incomes within groups may be a greater impediment to collective action than the number of ethnicities that comprise a group.⁵¹ The result of this study in regards to the socio-cultural variable is in line with the studies of Fujita et al, Gautam and Somanathan.⁵² They too do not find any association between their measures of socio-cultural heterogeneity and collective action. Similarly, in regards to heterogeneity of assets my results corroborate the results of prior studies undertaken by Tang, Lam and Ternstorm.⁵³ All these

⁵⁰ Ternstrom, Ingela. *The Management of Common-Pool Resources. Theoretical Essays and Empirical Evidence*. Stockholm School of Economics. EFI, The Economic Research Institute, 2002.

⁵¹ Regmi, Ashok R. "The Role of Group Heterogeneity in Collective Action. A Look at the Intertie between Irrigation and Forests. Case Studies from Chitwan, Nepal." (Ph.D. diss., Indiana University, Bloomington, IN, 2007)

⁵² Fujita, M., Hayami, Y., Kikuchi, M. *The conditions of Collective Action for Local Commons Management: The Case of Irrigation in the Philippines*. Study prepared at the Social Sciences Division as a part of the IRRI-Japan Shuttle Project, 2000; Gautam, Ambika. "Forest Land Use Dynamics and Community-Based Institutions in a Mountain Watershed in Nepal: Implications for Forest Governance and Management." (diss., Asian Institute of Technology, Bangkok, Thailand, 2002); Somanathan, E., Prabhakar, R., Mehta, B. *Collective Action for Forest Conservation: Does Heterogeneity Matter?* Indian Statistical Institute, Delhi. Planning Unit, India, 2002.

⁵³ Tang, Shui Yan. 1992. *Institutions and Collective Action: Self-Governance in Irrigation*. San Francisco, CA: ICS Press; Lam, Wai Fung. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. ICS Press, Oakland, CA, 1998. Ternstrom, Ingela. *The Management of Common-Pool Resources. Theoretical Essays and Empirical Evidence*. Stockholm School of Economics. EFI, The Economic Research Institute, 2002.

studies of irrigation systems find a negative correlation between income inequality and collective action. The size of the irrigation system as measured by its command area is also not correlated to performance. One might expect better coordination and collective action when system size is small but this is not the case. Again, this result is similar to the results that Tang and Lam report in their studies.⁵⁴

The effects of engineering infrastructure – type of headwork and canal lining – on irrigation performance appears not to be uniform. The presence of a sturdier and more permanent type of headwork on a system appears to be negatively correlated with performance. A sturdier cement-lined canal, on the other hand, is positively correlated to system performance. Though the results are not statistically significant their implications very much are. A truly permanent headwork, ironically, generates negative incentives for head-enders not to want to cooperate with tail-enders in system maintenance.⁵⁵ Partial or complete cement lining on the other hand appears to improve performance by minimizing system water losses thereby enabling water to reach the tail ends. The policy implication of such results is that an improvement in engineering infrastructure alone may not necessarily translate into improved system performance. Unless users are able to craft and enforce rules to cope with the asymmetries generated by improvements in irrigation infrastructure, the positive effects may well be cancelled out by the negative effects.

Resource Setting, Cooperation and Conflict

The general topography of a region can influence initial resource endowments. These conditions in turn determine the efforts that may be required to manage individual irrigation systems. Some systems may have to invest greater cooperative efforts than others to realize equivalent benefits but the fundamental cooperation dilemma for all systems is essentially similar. Intakes and canals have to be constructed and maintained on a periodic basis; rights and responsibilities have to be agreed upon; and appropriate rules have to be crafted,

⁵⁴ *Ibid* (Tang 1992; Lam 1998)

⁵⁵ *Ibid* (Lam 1998)

monitored and enforced. If multiple systems share waters from a common river course then intersystem arrangements also need to be worked out in addition to the intrasystem agreements. In the following sections I examine the response of individual irrigation systems to conditions of relative resource abundance and scarcity.⁵⁶

Conditions of Relative Water Abundance

Rapti is a perennial, E-W flowing, river with a dry season mean monthly discharge greater than the estimated water requirements of 11 FMIS that draw its waters. Water in the river course is fairly abundant round the year. Systems on this river have to cope with flooding and maintaining washed out intakes, which requires considerable resource mobilization, instead of conditions of water stress arising from reduced flows. Resource abundance does away with the need to maintain inter-system water sharing agreements and opens up opportunities for cooperation. An example of cooperation between irrigation systems in Chitwan are those between Jana Kalyan “Kha” and Amrit Kulo.

Amrit Kulo's water source used to be the Kanteswori stream. It served 25 hectares of land in Kathar VDC Ward number 7. Farmers of ward number 5 in 1983 proposed to farmers in ward number 7 to jointly construct a canal that would tap water from the Rapti River. Ward 7's cooperation was necessary because canals had to traverse their land before it could reach ward 5. Farmers from these two wards reached an agreement where both would jointly construct the main canal, Ward 7 would grant passage by allowing Ward 5 to use its existing infrastructure to transport water, and three parts of the water from the Rapti would go to Ward 5 and two parts to Ward 7. This canal named Janakalyan “Kha” was constructed in 1983. With its share of the water Amrit kulo was able to irrigate an additional 50 hectares of land, raising their total irrigated area to 75 hectares.

⁵⁶ Regmi, Ashok R. “The Role of Group Heterogeneity in Collective Action. A Look at the Intertie between Irrigation and Forests. Case Studies from Chitwan, Nepal.” (Ph.D. diss., Indiana University, Bloomington, IN, 2007)

Conditions of Relative Water Scarcity

If resource conditions are poor and there are not too many suitable sites to locate intakes then conflicts can arise not only between systems but also within a system. In some cases systems are able to resolve these conflicts while in other cases these conflicts can render the system virtually useless. An example of an intersystem conflict that was ultimately resolved is that of Pampa Kulo (PK) and Kyampa Kulo (KK). Another example of a system that has failed to function due to the inability of users to resolve their internal conflicts is that of Bahireni-Pakhadibas Kulo (BPK). All of these three systems draw water from the N-S flowing Pampa River.

Pampa is a seasonal river that flows through changing terrain from hills to plains. During the dry season the flow in the river course is drastically reduced and the lower reaches dry out completely. Pampa Kulo is upstream from Kyampa Kulo but their intakes are less than 300 meters from each other. The characteristics of both these systems are similar in terms of households and area served. Pampa has a smaller service area than Kyampa (70 vs. 100 hectares) but serves more households (140 vs. 120 hh). Both of these systems have exerted tremendous efforts to construct their systems and their infrastructures are in top condition suggesting very high levels of cooperation within the system. However, the two systems have been involved in extensive physical and legal battles over water rights. What sparked the battle was the construction of a semi-permanent structure by Pampa at its intake.⁵⁷ Kyampa's claim was that this construction drastically reduced their water shares. After years of conflicts an agreement has been reached which requires Pampa to release sufficient water during winter to irrigate Kyampa's wheat crops.⁵⁸ Relative water scarcity is the source of conflict between these systems; however, they have been able to resolve their conflicts.

⁵⁷ Shukla, A., Gajurel, K., Shivakoti, G., Poudel, R., Pandit, K., Adhikari, K., Thapa, T., Shakya, S., Yadav, D., Joshi, N., Shrestha, A. *Irrigation Resource Inventory of East Chitwan*. Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal, 1993.

⁵⁸ Water stressed systems grow two crops, rice in the summer and wheat in the winter.

The intake of Baireni–Pakhadibas Kulo is located about 2 km downstream from the intake of Kyampa Kulo. Naturally, less water is available in the river where its intake is located. Further, scouring of the river bed has lowered its elevation at the intake. Since the differences in elevation between intake and canals are becoming smaller this is reducing the natural flow of water into the canal. During the dry season, when water volumes in the river are low, flow in the canals is reduced to a trickle. Relocating the intake to higher elevations is possible but requires serious investments in time and labor. Also, a significant length of the main canal passes through difficult mountain terrain prone to landslides. Given these conditions user groups are facing difficulties in operating the system. Serious conflicts have arisen among the Tharus and the Tamangs, the two major ethnic groups sharing this system, over labor contribution and water sharing issues. This has led to a decline in the condition of the infrastructure, and the system on average is able to access water only for two months a year.

Conditions That Enhance Self-Organization

Attributes of a resource that are considered important for self-organization are chances of feasible improvement, predictability of resource units and moderate size boundaries.⁵⁹ Also, unless modest levels of scarcity are apparent to users little efforts will be exerted to organize. Scholars also agree that appropriators who are dependent on a resource, intend to use their resource over a long period of time, have achieved certain levels of trust, and who possess some level of autonomy to make their own rules, are most likely to organize. Many of the aforementioned variables are in turn influenced by the larger political regime in which users are embedded. Whether users are actually able to organize, however, depends on the benefits and costs of changing institutional rules as perceived by those who can change them.

From the examples presented in the previous section we note that group efforts required to self-organize for irrigation are not trivial. Farmers under varying resource conditions have to define command areas, negotiate canal alignments,

⁵⁹ Ostrom Elinor. *Self-Governance and Forest Resources*. Center for International Forestry Research, 1999.

construct and maintain infrastructure, and coordinate efforts to design institutions that all agree to abide by. Despite the costs involved there are also benefits to be realized from cooperation. Year-around irrigation not only ensures higher crop yields but also increased cropping intensities. The ability to produce two rice crops annually instead of one is a strong motivation for farmers to cooperate. Since the benefits of organizing are valued and commonly understood, most user groups are able to create and sustain agreements to avoid serious problems of appropriation and provision. Under certain conditions we also see that groups can fail. For the most part, however, FMIS in Chitwan are able to overcome the basic cooperation dilemma.

Each successful self-governed common-pool resource system copes with its own settings by designing institutions that are most relevant to its own conditions. The particular rules that successful systems use may vary substantially from one another but there are common principles underlying their success. Ostrom⁶⁰ calls them the design principles and has identified them to be a) presence of boundary rules; b) congruence; c) ability to monitor and sanction; d) right to modify rules; e) minimal recognition of rights to organize; and f) mechanisms for conflict resolution. Most of these design principles can be observed in the farmer managed irrigation systems of Chitwan. Users maintain written records and know exactly which households have the rights to withdraw resource units and which don't; there are clear, commonly understood rules defining who can appropriate how much resource units and when; all are aware of what constitutes an infraction; a simple, effective and low cost monitoring⁶¹ mechanism is in place; rule infractions attract graduated sanctions; WUAs have the power to change operational rules via the general assembly; WUAs are registered with department of irrigation and have legal standing; and, finally, informal conflict resolution mechanisms exist to resolve potential problems.

⁶⁰ Ostrom Elinor. *Context and Collective Action: Four Interactive Building Blocks For a Family of Explanatory Theories*. Workshop In political Theory and policy Analysis, Indiana University. 1999.

⁶¹ In irrigation systems the cost of monitoring is relatively low. The irrigator who is about to complete his turn would like to extend his time, but the next irrigator in line is waiting for him to finish his job and would like to start early. The presence of one deters the other and additional resources do not have to be invested to monitor, one is simply waiting his turn.

There are conditions that are conducive to self-organization and there are also conditions that can threaten the abilities of communities to manage their institutions. Ostrom cites the inability to cope with rapid exogenous changes as one of the factors that can threaten the robust governance of common-pool resources.⁶² An example of an exogenous shock that led to the breakdown of a system in Chitwan is that of Jyamire Kulo, a system on the Kair River. Incessant floods washed away its intakes and flooded not only its farmlands but also those of neighboring systems. There was tremendous pressure on Jyamire Kulo to close its intake. A permanent gabion wall over hundred meters in length had to be constructed to contain the floods. Since Jyamire Kulo was a small irrigation system (55 hectares, 100 households) it was unable to generate sufficient resources to develop a diversion structure at an alternate site. Farmers now rely on the drainage waters of neighboring systems and some on private pumps for their water needs. A well-functioning system instantly went out of commission due to its inability to cope with an exogenous shock. Such shocks can also be induced by rapid out-migration or in-migration from or into an area. Out-migration can change the economic viability of a regime due to the loss of those who contributed resources. In-migration can bring in new participants who do not trust and others and share extant social norms that have been established over a long period of time.⁶³ Since collective action is based on mutual trust and reciprocity self-organized resource regimes can quickly disintegrate if population changes occur rapidly. Threats to self-organized small scale resource governance systems can also come from transmission failures from one generation to the next of the operational principles, corruption and opportunistic behavior, lack of large-scale institutional structures to support governance at the local level; and easy access to external funds.⁶⁴

FMIS face a variety of challenges. Under some set of conditions they are able to perform well and not so well in other sets of conditions. There are certain attributes that are conducive to self-organization and others that are not. They

⁶² Ostrom, Elinor. *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press, 2005

⁶³ *Ibid.*

⁶⁴ *Ibid.*

are also continuously subject to external threats, some of which they are able to cope with and others that can quickly unravel long-established systems. Particular examples associated with each of the above scenarios can be observed across the FMIS of Chitwan. However, in general, most perform fairly well given their particular conditions. They have effective water users' organizations with well-defined rules for water allocation, distribution, resource mobilization, and conflict resolution; they are low cost and based on local resources; and leaders of these systems are accountable to the users. Their technical deficiencies are well compensated by the managerial inputs. FMIS can be suitable vehicles for improving agricultural performance. Policies to improve irrigation performance have to be geared toward supporting these self-organized local resource management systems.

Policies to Improve Irrigation Performance

Emphasize Institution Building

Cooperation among villagers cannot be assumed. Even in instances where cooperation could have benefited all parties, there are examples from Chitwan of sophisticated agency-managed irrigation infrastructure falling into disrepair due to collective inaction in assuming responsibilities for system operation and maintenance. There are many dimensions to the basis for cooperation among individuals. Individual common-pool resource users are likely to contribute and cooperate only if they perceive that they will be able to reap the long-term benefits of engaging in collective action. They are also more likely to cooperate if they are aware of their interdependence and see mutual benefits resulting from working together. The presence of a set of credible, commonly understood, well-enforced and agreed-upon rules further helps in generating a positive incentive system for villagers to engage in collective action. Without creating the right environment, bureaucracies cannot assume that cooperation among resource users will develop naturally once an irrigation system has been handed over to the users.

The relationships between Nepali government officials, who are charged with oversight of natural resource systems, and resource users are generally based on

the dominance-dependence relationship. Villagers are discouraged or disallowed from taking initiatives. The villager, therefore, sees no incentive in taking responsibility and assumes that it is the government's role to assume responsibility for the operation and maintenance of the resource system. Given the non-incentives for villagers to participate, system performance hinges on the capabilities of the government officials. With inadequate resources, weak incentives to perform, and inadequate understanding of resource systems, these officials very often fail to perform. It, therefore, comes as no surprise to see agency-managed irrigation systems turning dysfunctional. Common-pool resource systems are co-production processes that perform best when both the oversight agencies and resource users cooperate in making the system work. Non-cooperation by either party results in poor performance.

Developing sustainable common-pool resource systems involves not only the application of technical skills but institutional design skills as well. Failures in most instances occur not because of deficiencies in technical skills but due to lack of knowledge in designing institutions⁶⁵ Since the most important consideration in institutional design is the process of developing a set of rules that participants in a process understand, agree upon, and are willing to follow, valuable insights can be gained by understanding them and their interrelationships. Agencies charged with oversight responsibilities need to recognize this.

Recognize Local Institutions

Policy actions that aim at facilitating the development of local institutions might have greater chances of success if existing local institutions are recognized and encouraged. Institutions are built on common understandings that take years to build.⁶⁶ If such an understanding already exists in a local community, this is a source of great strength. Institutional development is a slow process based on the principles of trial and error. One cannot expect new

⁶⁵ Ostrom, Elinor. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco, CA: ICS Press, 1992.

⁶⁶ *Ibid.*

institutions to take root merely by introducing them, that too, without the support of the community who are affected by them.

The Department of Irrigation has frequently imposed its institutional designs and organization structures on irrigation communities. Imposing these structures adversely affect the functioning of local organizations if they exist. When legitimacy of local institutions is challenged, farmers' faith in local institutions vanishes quickly. When agencies intervene to develop irrigation infrastructure in potential areas, they need to recognize the presence of existing systems.

Officials often see local organizations merely as arrangements through which to obtain a community's contributions and cooperation. Very little attention is paid either to encouraging or developing the governing function of these organizations. Participation is thus frequently equated to getting the villagers to fit their efforts in the operation and management plan suggested by the officials. Policy actions, therefore, need to be strongly linked with an institutional environment where villagers are provided positive incentives to participate in crafting rules and engage in productive working relationships. Farmers have to be recognized as being intelligent with capabilities to make informed decisions and engage in collective action.

Engage Local Resource Users

Farmers are very knowledgeable about stream flows, crop preferences, stability of land, and a host of other time and space information. Such types of information are extremely valuable in operating irrigation systems under considerable amounts of uncertainty. The weather, topography, and changing needs of appropriators introduce uncertainties in assessing the volume of resource units that will be available to an irrigation system. During monsoons, the intakes and embankments are regularly breached requiring emergency action. Discharge from the rivers during winters also decreases drastically, requiring major adjustments in the appropriation rules. Unless users are able to quickly adapt to changing conditions, system operation can drastically suffer. A quick response is not possible, however, without user participation and

cooperation. If local knowledge and participation can be incorporated into designing rules governing resource use, then it is more likely the systems will function successfully. Without a clear understanding of the local time and space information that users possess, designing rules to regulate forest resource use may not, again, be effective.

Efforts at helping communities to develop institutions, therefore, have to be directed toward enhancing their capabilities and willingness to relate to and work with one another, rather than handing down rules or organizations to govern resources. Institutions, no matter how well designed they are in the beginning, will subsequently require adjustments to changing conditions. Unless these changes can be incorporated, institutions quickly become ineffective. It is, therefore, important that resource users affected by the operational rules are permitted to participate in modifying the operational rules. Since the lifestyles of resource users are closely linked to their resource systems, they are the ones who are most knowledgeable about the resource conditions. Unless they are involved resource management can be expected to be both ineffective and inefficient.

Secure Legal Standing

Historically, farmer-managed irrigation systems (FMIS) were never recognized as a legal entity. Not only did they not have legal standing but even their contribution toward irrigated agriculture was not recognized by the Irrigation Department despite their significant contributions (even today, nearly 75% of irrigated agriculture in Nepal is a result of FMIS). Developing irrigation infrastructure for the Department meant the construction of medium and large-scale systems,⁶⁷ especially in the Terai. Planning, construction, implementation, operation and management, and maintenance were all considered to be responsibilities of the Irrigation Department. The beneficiaries (resource users) did not have a role to play in any of these processes. In more recent times, however, with the adoption of the irrigation policy of 1992, provisions have been made for users' participation in the agency-led irrigation development

⁶⁷ A command area of approximately 500-2,000 hectares is defined as a medium-scale irrigation system. Anything above 2,000 hectares is considered large scale.

programs. The Water Resources Act of 1992 also, for the first time, acknowledged the legal rights of duly registered water users associations with their own bidhans (charters). This is a significant step forward in ensuring secure property rights.

The enactment of key legislations does not instantly alter the power relationships between the bureaucracy and the users, nor does it ensure ready cooperation by the users.⁶⁸ Regardless of legislations, the national government and its agencies quite often fail to translate their policies into action. This inability, or rather the unwillingness, of the agencies to recognize diverse local rules governing rights and responsibilities is often a major impediment to successful self-organization. Legislations alone may not change the situation overnight, but it does provide a legal base and legitimacy to user groups to assert their rights.

Practice Nuanced Interventions

It sounds counterintuitive to assert that irrigation system efficiencies may actually decline if temporary irrigation structures are replaced by permanent ones. However, Lam's results from the study of Nepali irrigation systems point in that direction.⁶⁹ He finds that the provision of permanent headworks is not a sufficient condition to improve irrigation performance, implying that technological fixes alone may not be the solution to improve system efficiencies. The amount of labor required for operation and management activities are significantly reduced by permanent structures; therefore, labor contribution by tail-end farmers becomes unimportant to farmers at the head end. Negative incentives are thus generated for headenders to ignore the demands of the tailenders, resulting in low levels of cooperation and hence lower productivity. An important policy implication is that there must be as much emphasis on developing social capital as there is on developing physical capital when

⁶⁸ Seymour, F.J., Rutherford, D. Contractual agreements in Asian social forestry programs. Paper presented at the First Annual Meeting of the International Association for the study of Common Property, September 27-30, Durham, North Carolina, 1990.

⁶⁹ Lam, Wai Fung. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. ICS Press, Oakland, CA, 1998.

undertaking projects to assist irrigation systems. Care needs to be taken to ensure that assistance does not negatively affect cooperation.

Conclusion

Irrigation systems face a variety of challenges. The terrain can be difficult, rivers can be disruptive, group members may belong to diverse cultural backgrounds, group sizes can vary, asset endowments may differ, and interests may differ within groups. Given these constraints an irrigation system has to be able to solve the fundamental problems of provisioning and appropriation associated with common pool resources. Intakes and canals have to be constructed and maintained on a periodic basis and working rules have to be crafted to reflect appropriation rights and responsibilities. This paper argues that such activities, which consume lots of energy and require the mobilization of significant resources, tend to be undertaken more effectively by self-governed groups rather than by centralized government agencies.

Though FMIS potential may be substantial, the paper also recognizes that not every FMIS is successful. Some resource settings tend to be more conducive for self-organization than others. Poor irrigation performance, for instance, tends to be associated closely with topography. However, the abilities of groups to craft rules and their willingness to monitor and enforce them can to a great extent overcome the problems associated with initial resource endowments. The lack of leadership abilities or prior organizational history, in fact, can turn out to be more detrimental to irrigation performance than initial resource endowments, ethnic differences, or even the presence of permanent irrigation infrastructure. Understanding how different variables interact in different settings can help in designing policies that can strengthen institutional and governance capabilities of FMIS.

The study suggests that farmers in Chitwan have been able to overcome collective action problems and are fairly successful at managing water resources in their unique settings. This implies that, even though it is difficult, it is possible that resource users with a supportive political system can locally overcome what are assumed to be severe collective action problems. If external

assistance is geared toward supporting the farmers' efforts to develop their own institutions, this could potentially result in enhanced water security and improved irrigation performance.

References

- Angood, C., Chancellor, F., Hasnip, Morrison, N., Smith, J. *Contribution of Irrigation to Sustaining Rural Livelihoods: Nepal Case Study*. KAR Project 7879. HR Wallingford, DFID, 2002.
- Asian Development Bank (ADB). *Technical Assistance to the Kingdom of Nepal for Preparing Community Managed Irrigation Sector Project in Central and Eastern Basins*. TAR NEP:33209, ADB, Manila, 2001.
- Dhakal, Sanjaya. "Whither Power Sector." *Spotlight Weekly*, Kathmandu: Vol. 23, No. 43, May 14-20, 2004.
- Food and Agriculture Organization of the United Nations (FAO). *Aquastat Nepal. FAO's information system on water and agriculture*. Land and water Development division, Rome, 1999.
<http://www.fao.org/ag/agl/aglw/aquastat/countries/nepal/index.stm>
- Fujita, M., Hayami, Y., Kikuchi, M. *The conditions of Collective Action for Local Commons Management: The Case of Irrigation in the Philippines*. Study prepared at the Social Sciences Division as a part of the IRRI-Japan Shuttle Project, 2000.
- Gautam, Ambika. "Forest Land Use Dynamics and Community-Based Institutions in a Mountain Watershed in Nepal: Implications for Forest Governance and Management." (diss., Asian Institute of Technology, Bangkok, Thailand, 2002)
- Hilton, Rita. "Institutional Incentives for Resource Mobilization in Farmer-Managed and Agency-Managed Irrigation Systems." In: Shivakoti, Ganesh P., Ostrom, E. (Eds.), *Improving Irrigation Governance and Management in Nepal*. ICS Press, Oakland, CA. 2002.
- International Commission on Irrigation and Drainage (ICID). *Sector Vision: Water for food and rural development - country position paper on Nepal*. ICID, 2000.
http://www.icid.org/v_nepal.pdf
- Lam, Wai Fung. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. ICS Press, Oakland, CA, 1998.

- Ministry of Finance (MOF). *Economic Survey*. Kathmandu: Government of Nepal, 2006.
- National Planning Commission (NPC). *Irrigation Development in Retrospect: Search for a breakthrough*. National Planning Commission, Kathmandu, 1994.
- Nepal National Committee of International Commission on Irrigation and Drainage (NENCID). *Country Position Paper Nepal*. <http://www.icid.org/> accessed Jan, 2007.
- Ostrom, Elinor. *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press, 2005.
- Ostrom, Elinor. "The Challenge of Underperformance." In: Shivakoti, Ganesh P., Ostrom, E. (Eds.), *Improving Irrigation Governance and Management in Nepal*. ICS Press, Oakland, CA, 2002.
- Ostrom, Elinor. "Reformulating the Commons." In: Burger, J., Ostrom, E., Norgaard, R., Policansky, D., and Goldstein, B. (Eds.) *Protecting the Commons: A Framework for Resource Management in the Americas*. Island Press, Washington, D.C., Chapter 1, 2001.
- Ostrom Elinor. *Context and Collective Action: Four Interactive Building Blocks For a Family of Explanatory Theories*. Workshop In political Theory and policy Analysis, Indiana University. 1999.
- Ostrom Elinor. *Self-Governance and Forest Resources*. Center for International Forestry Research, 1999
- Ostrom, Elinor, Gardner, Roy. "Coping with Asymmetries in the Commons: Self-Governing Irrigation Systems Can Work." *Journal of Economic Perspectives* 7(4): 93-112, 1993.
- Ostrom, Elinor. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco, CA: ICS Press, 1992.
- Ostrom, Elinor. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press, 1990.
- Poudel, Rabi, Pandit, K., Adhikari, K., Shakya, S., Yadav, D., Joshi, N. *Inventory and Need Assessment of Irrigation Systems in North-East Tanahau*

(Volume-I). A report prepared for International Irrigation Management Institute (IIMI) by Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science. Chitwan, Rampur, Nepal, 1994.

• Pradhan, Prachanda. *Patterns of Irrigation Organization in Nepal. A comparative Study of 21 Farmer Managed Irrigation Systems*. Country paper No. 1, IIMI, Colombo, Sri Lanka, 1989.

• Regmi, Ashok R. "The Role of Group Heterogeneity in Collective Action. A Look at the Intertie between Irrigation and Forests. Case Studies from Chitwan, Nepal." (Ph.D. diss., Indiana, University, Bloomington, IN, 2007)

• Seymour, F.J., Rutherford, D. Contractual agreements in Asian social forestry programs. Paper presented at the First Annual Meeting of the International Association for the study of Common Property, September 27-30, Durham, North Carolina, 1990.

• Shah, Shree Govinda and Gautam Singh. *Irrigation Development in Nepal Investment, Efficiency and Institution*. Research Report Series, Series No. 47. Winrock International, Kathmandu, Nepal, 2001.

• Shangraula, Bikash. "Water Supply dips with Daily Power Cuts." *Kathmandu Post*, Feb 5, 2007.

• Shivakoti, Ganesh P and Elinor Ostrom. *Improving Irrigation Governance and Management in Nepal*. Oakland, CA: ICS Press, 2002.

• Shukla, A., Gajurel, K., Shivakoti, G., Poudel, R., Pandit, K., Adhikari, K., Thapa, T., Shakya, S., Yadav, D., Joshi, N., Shrestha, A. *Irrigation Resource Inventory of East Chitwan*. Irrigation Management Systems Study Group, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal, 1993.

• Somanathan, E., Prabhakar, R., Mehta, B. *Collective Action for Forest Conservation: Does Heterogeneity Matter?* Indian Statistical Institute, Delhi. Planning Unit, India, 2002.

• Tang, Shui Yan. 1992. *Institutions and Collective Action: Self-Governance in Irrigation*. San Francisco, CA: ICS Press.

- Ternstrom, Ingela. *The Management of Common-Pool Resources. Theoretical Essays and Empirical Evidence*. Stockholm School of Economics. EFI, The Economic Research Institute, 2002.
- United Nations Development Program (UNDP). *Human Development Report - Beyond scarcity: Power, poverty and the global water crisis*. 2006.
- Water Aid Nepal. *Water Laws in Nepal: Laws Relating to Drinking Water, Sanitation, Irrigation, Hydropower and Water Pollution*. Water Aid Nepal, Lalitpur, Nepal, 2005.
- World Bank. *Environment at a Glance 2004 Nepal*. Environment Department, World Bank. Washington D.C., 2004

III. Coping with Policy, Institutions, and Governance Challenges of Water Resources Issues with Special Reference to Irrigation in Nepal

Ganesh P. Shivakoti ¹

Abstract

Variations in water resource management, with special reference to irrigation policies, institutions and governance, have resulted in varied performances over the last two decades. During the same period, we have also witnessed contradictions between the State level and Irrigation Systems level, and the state has begun to retreat from irrigation both in terms of investment and in direct operations – which has paved ways for alternative actions both by users and other non-user stakeholders with an interest in irrigation development and management. In order to develop coping mechanisms in light of the state's retreat policy, irrigation systems at the local level have come up with alternative modes of irrigation governance and management through the development of local level institutions, including local multi-functional cooperatives, farmers-to-farmers training approaches, alternative O&M mechanisms and a shift in irrigated agricultural research strategies toward focusing on efficiency at field level. Several research studies with innovative approaches have been able to provide policy feed-back during the last two decades, which include dynamics studies with cross-sectional data, integration of hydrological and political boundaries, analyzing the effect of intervention overtime, political economy approach and analysis of livelihood asset pentagon for irrigation system performance assessment. This paper discusses these changes both in terms of farmers' development of coping mechanisms and the usefulness of emerging

¹ Professor, Agricultural and Natural Resources Economics, School of Environment Resources and Development, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand, E-mail: ganesh@ait.ac.th

research methods for policy feedback for the effective governance of irrigation systems at the local level in Nepal, and also in regard to the emerging challenges ahead.

Introduction

The past few decades have experienced major changes in irrigation policies; these include participatory planning and decision-making about irrigation investments, management transfer programs, new approaches towards assistance to farmer-managed irrigation systems, and the joint financing of irrigation systems among others.² Several policy changes have been adopted by governments in many countries to improve the institutional frameworks for irrigation management. Irrigation management has experienced a shift in governance mode and, in recognizing the limitations of the bureaucratic mode of irrigation management and the value and potential for local governance, it has opened the way for transferring responsibilities from irrigation bureaucracies to user groups. This is not, however, sufficient for developing effective institutions. Solutions require an understanding of institutional design, as well as the dynamics of institutional development.³ The shift in policy and governance mechanism has also resulted in a varying level of performance.⁴

The last two and half decades have witnessed contradictions between state and irrigation systems. At the irrigation system management level, the state, in many developing countries, has begun to retreat from the irrigation sector both in terms of investment and direct operation. At policy level, however, irrigation, as a major factor of production for agriculture, continues to be a major policy issue of concern for politicians.⁵ The main reason for the retreat of the state is its failure to find a proper role for itself in irrigation management.

² See, Coward, 1980; Uphoff, 1986; Ostrom 1992; Vermillion 1997; Groenfeldt and Svendensen 2000; Shivakoti et al., 2005.

³ See, Lam, 1996, 1998; Ostrom, 1990, 1992, 2005; Ostrom et al., 1994; Shivakoti, 1992; Shivakoti and Ostrom, 2002; Shivakoti et al. 2005.

⁴ See, Lam, 1998; Samad, 2001; Shivakoti and Ostrom, 2002.

⁵ Shivakoti, G. P. 2005. Responding to the Challenges of Asian Irrigation in Transition. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems and Governance

The continuously changing environment in which irrigation systems operate constitutes another challenge to irrigation management. Rapid economic development, competitive uses of water and changes in the political and social setting pose many new challenges for irrigation management. As industrialization advances and economies develop, irrigation becomes more than simply delivering water to fields.⁶

Past studies suggest that there have been interventions of various types and different sorts of institutional mechanisms adopted. The variation in interventions and governance mode has also resulted in varied performances. Now, at the beginning of the twenty first century, additional water-related issues are emerging. In order to develop coping mechanisms with the state's policy of retreat, irrigation systems at the local level have to come up with alternative modes of irrigation governance and management through the development of local level institutions, including local multi-functional cooperatives, farmers-to-farmers training approaches, alternative O&M mechanisms and a shift in irrigated agricultural research strategies toward focusing on efficiency at field level. Researchers in the meantime have been able to provide policy feed-back through dynamics studies with cross-sectional data, integration of hydrological and political boundaries, by analyzing the effect of intervention overtime, political economy approach and analysis of livelihood asset pentagon in the changing context for irrigation system performance assessment. This paper discusses these dynamic changes both in terms of farmers' development of coping mechanisms and the usefulness of emerging research methods for policy feedback for the effective governance of irrigation systems at the local level in Nepal, and also in regard to the emerging challenges ahead.

Alternatives', proceedings of the Third International Seminar held on 9-10 September 2004, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

⁶ Lam, W. F. 1996. Institutional design of public agencies and coproduction: A study of irrigation associations in Taiwan. *World Development*, 24(6):1039 - 1054; Shivakoti, G. P. and R. C. Bastakoti. 2006a. The robustness of Montane irrigation systems of Thailand in a dynamic human-water resources interface. *Journal of Institutional Economics*. 2 (2):1-26.

Nepal's Water Resources Policies and their Impact on Irrigation Development

If we examine the emergence of water resource policies in Nepal, we have to go back to the Civil Code 1853, which was the first comprehensive statutory law in Nepal.⁷ It established the prior rights of people on the usage of water owing to their land being located in the irrigation system. Some specific provisions were made for the utilization of water for irrigation. While the ownership of land within an irrigation system provided individual rights for the usage of water, it also made provision that irrigation systems diverting water from the rivers would have prior rights and that new systems must get approval from the users of the irrigation system already in operation. The first attempt to make a specific law for the water sector was the Irrigation Act of 1961. This was then replaced by the comprehensive Canal, Electricity and Water Resources Act of 1967, which introduced the concept of water tax and licensing for water use, although licensing was only implemented for the use of water in hydropower generation.

Currently, there exist four policies, two acts and five regulations related to the water resources of Nepal. Among those that are directly related to irrigation development and management are: Water Resources Act (WRA) 1992, Water Resource Regulation (WRR) 1993, Irrigation Regulation (IR) 1999, and Irrigation Policy (IP) 2003. DOI is the lead agency for irrigation development in the country. DOI has a network of five Regional Irrigation Directorates (RIDs) and 75 DIOs. It has a total of 2,355 sanctioned posts. Of the total posts, around nine percent have been sanctioned for the central department, 13 percent in the pool, eight percent for the RIDs, and the remainder for the DIOs.

In Nepal, irrigation systems developed so far are run-off-the-river types. They were mainly developed to supplement the water needs of paddy-fields during the monsoon season. However, it is realized that water scarcity is one of the most important constraining factors for agricultural intensification and commercialization. Thus, to supply water to irrigation systems round the year, the development of storage-type irrigation systems was felt necessary to

⁷ Khanal, R. R. 1982. *Muluki Ain Kehi Bibechana* (in Nepali language). Sajha Prakashan Press, Lalitpur, Nepal.

encounter the problem of the reduced flow of rivers in the winter and spring seasons. In this context, the IP 1992 was amended twice, the first time in 1996 and the second time on August 4, 2003 with the main objectives of providing round-the-year irrigation facilities to irrigation-suitable land; it was to do this through the effective utilization of the current water resources of the country, by developing the institutional capability of water users for the sustainable management of the existing system, and by enhancing the knowledge, skill and institutional working capability of technical human resources, water users and non-government associations (or organization relating to the development of the irrigation sector). However, this policy has not been able to promote the reservoir type of irrigation systems that enable irrigators to control the amount of water they receive when they need it.

The Irrigation Policy 2003 consists of two chapters: the first chapter deals with the Policy, and the second with the Working Policy. The salient feature of the policy and its probable impact on irrigated agriculture is briefly outlined below.

- GON will declare the Irrigated Area where the irrigation facility is available. Permission of GON should be obtained for non-agricultural uses of land which are declared as Irrigated Area. This policy is expected to prevent the current increasing encroachment of irrigation systems and irrigated land for other uses.
- Projects formulated shall be guided by the principles of Integrated Water Resources Management (IWRM) to ensure water availability for all stakeholders, return of investment, investment sharing and self-insurance against natural calamities.
- Conservation and the promotion of year round irrigation will be implemented through such activities as water reservoirs, rainwater harvests and groundwater resources as supplementary sources to the seasonal rainfall. With careful implementation of this policy, the frequent occurrence of floods will be minimized due to the retention of rain water from flowing down directly.

- Provision for the preparation of a master plan for the trans-basin water transfer and management from water-surplus large river basins to water deficit areas should be considered as one of the best and ambitious policies relating to the land and water resources development of Nepal.
- DOI shall, in coordination with the Water and Energy Commission Secretariat, develop and manage the water reservoir projects deemed appropriate mainly for irrigation purposes. The probable production of electricity by using these water reservoirs side-by-side also through the development of other irrigation systems shall be encouraged.

This policy rightly captures the essence of Nepal's overall land and water resources development through the integration of irrigation and electricity development. In fact, their isolated development, as was done in the past, was presumed to invite severe conflict in the future and thus push a resource-rich country like Nepal into a vicious cycle of poverty.

Current Issues

Current issues in irrigation development and agricultural performance relate to increasing watershed degradation, eroding social capital and transforming subsistence agriculture to more commercialized forms. These are briefly described below.

Watershed Degradation

Nepal has a rich but fragile environment. The combination of rugged topography, young geology and monsoon climate produce high rates of run-off, erosion and sedimentation. In addition, increasing dependency on such fragile land for cultivation, fuel wood, grazing and fodder has further worsened the situation. About 6,000 rivers and rivulets with a total drainage area of about 194,471 km² flow through Nepal, with 76 percent of this area contained in Nepal and the rest in China and India.⁸

⁸ WECS (Water and Energy Commission Secretariat). 2002. *Water Resources Strategy: Nepal*. WECS, Kathmandu, Nepal.

Irrigation systems in Nepal are becoming increasingly vulnerable due to higher sediment rates and the frequent damage caused by flash floods. Among FMISs and AMISs, the former are commended for their endogenous mix of local wisdom and social cohesion in overcoming these problems; but these systems are now exposed to new threats deriving from the effects of globalization. Some of these threats include the following: the increasing shift from farm labor to non-farm employment; farming remaining increasingly in the hands of ageing people; weakening social cohesion and collective action due to labor shortages and increasing socioeconomic heterogeneity resulting from in- and out-migrations; and rising maintenance costs of the system due to the increasing need for external cash inputs such as cement, iron rods, skilled labor, and post-system improvements.⁹

The implications of watershed degradation highlight the following: the need for strong irrigation infrastructures because traditional structures have become increasingly vulnerable to floods; irrigation development is becoming time-consuming and cumbersome requiring external supports due to the reduced significance of traditional technology (knowledge, skill and local resources); irrigation development is getting costlier requiring external knowledge, skill, financial and material resources; irrigation development and management scopes are widening from system to basin level; and decreasing access to water resources is negatively impacting on crop production and productivity. Thus, the sustainable solution in the changed context would point to sharing the benefits of water resource use with a holistic approach of watershed development and management, still placing due emphasis on irrigation but integrating the efficiency and equity issues of water uses. It might need a socioeconomic, geopolitical and policy environment that enhances the benefit sharing of water resource uses with the development and management of watersheds.

⁹ Shrestha, S. G. and Shivakoti, G. P. 2004. Livelihood Asset Pentagon to Assess the Performance of an Irrigation System. *Asia Pacific Journal of Rural Development*, July 2004, Vol. XIII, No. 1.

Eroding Social Capital

Irrigation requires large investment during both the development and operation stages. Peoples' participation during these stages is very much crucial in order to reduce costs and to make the system's operation sustainable. Historically, irrigation system development in Nepal involved the knowledge, skills and labor contribution of many people for several years. Communities have been managing these facilities through informal rules, norms or codes, and by assigning rights and responsibilities among themselves, all of which have been tested over time.

FMISs have simple structures but are designed and developed in accordance with the newest ideas relating to hydrology, ecosystems and socioeconomic bases, and also on the basis of indigenous knowledge, skills and experiences transmitted through generations.¹⁰ The survey and construction of irrigation structures were traditionally done with great accuracy, but without the aid of modern and expensive equipment. All such traditional systems divert water from streams and small rivers with temporary headwork made of stones, logs, shrub branches, pebbles and sand.

The development and adoption of indigenous weirs have enabled several FMISs to survive and continue to irrigate large areas of croplands along the streams and rivers. The accumulated knowledge and experiences and adoption of indigenous technology had been functional in balancing water uses and users among communities and creating harmony and integrity within and between them. It is an excellent example of social capital formation being perpetuated for a prolonged period of time – in this case for centuries. Local communities themselves had crafted rules and maintained such community resources. The sustenance of nine FMISs drawing water from the same Pampa stream within its 15 km stretch attests to this.¹¹ Over time, FMISs have developed strong communal ownership on water resources; something which was strengthened

¹⁰ Shrestha, S. G. 2004. Irrigation System Performance Indicators in Relation to Farm Livelihoods in Chitwan, Nepal. Doctorate degree dissertation submitted to Asian Institute of Technology (AIT), School of Environment, Resources and Development, Thailand. AIT, Thailand.

¹¹ *Ibid.*

by the usufruct right defined in the Civil Code¹² and incorporated in the Water Resource Act and Regulation of Nepal later on.

The prevalence of traditional irrigation structures coupled with decreasing labor contribution and the occurrence of frequent and violent flash floods have compelled the community to look for alternatives. The increasing access to financial resources from banks plus huge public investment available as loans and grants has motivated farming communities to adopt modern technology such as permanent weirs (wherever it does not adversely affect other users), canal linings among others in addition to switching from labor to cash contribution mode.¹³ However, the crux of the problem lies in the declining watershed conditions. With the increasing decline in watershed conditions, strong concrete structures were also reported destroyed by the violent flash floods which occurred due to deteriorating conditions of forests and uncontrolled grazing and extensive cultivation of marginal land.

Ostrom¹⁴ states that a high labor requirement brings equity in water distribution among irrigators. The labor requirement is reduced considerably with the improvement in physical capital. Thus, the author lays emphasis on considering previous social capitals while making improvements in physical capitals, if such social capitals are to be sustained or enhanced in future. Moreover, the communities in question have much more knowledge about the biophysical conditions of their particular locality. An effective irrigation system is not just the accumulation of good physical capital, but a strong build-up of social capital

¹² Khanal, R. R. 1982. *Muluki Ain Kehi Bibechna* (in Nepali language). Sajha Prakashan Press, Lalitpur, Nepal.

¹³ Shrestha, S. G. and Shivakoti, G. P. 2004. Livelihood Asset Pentagon to Assess the Performance of an Irrigation System. *Asia Pacific Journal of Rural Development*, July 2004, Vol. XIII, No. 1; Shivakoti, G. P. 2002. Intervention in Montane Farmer Managed Irrigation Systems of Thailand and Vietnam: How Participatory and Dynamic are the Process? In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

¹⁴ Ostrom, E. 2002. How Farmer Managed Irrigation Systems Build Social Capital to Outperform Agency Managed Systems that Rely Primarily on Physical Capital. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

too. Thus, assistance that promotes dependency syndrome and exterminates traditional resource mobilization, including labor and skills, should be avoided.

In the Pampa and Surtani FMISs, some of the farm households were reported to have preferred to pay cash for outsourcing rather than family labor contribution for rehabilitation as well as regular O&M activities.¹⁵ In some areas farmers no longer mobilize labor for maintenance because of the high percentage of household members with off-farm employment.¹⁶

The implications of eroding social capitals are: increasing difficulty in managing (O&M and rehabilitation) traditional irrigation systems; local labor not being used to improve irrigation infrastructures; the need for a paradigm in system management including resource mobilization and conflict resolution, which require considerable amount of time and resources; the higher cost of production associated with the need for skilled labor from outside. Therefore, ways should be sought for integrating social and economic participation with the improvement in physical capital.

Transformation of Subsistence Agriculture

The transforming of subsistence agriculture to a more commercialized form is a great challenge in many Asian countries because irrigation systems and management – that have been designed mainly for grain production – need to make a paradigm shift in irrigation cycles and water needs.¹⁷ In general, commercial crops are more sensitive to the timing and amount of irrigation water.

¹⁵ Shrestha, S. G. and Shivakoti, G. P. 2004. Livelihood Asset Pentagon to Assess the Performance of an Irrigation System. *Asia Pacific Journal of Rural Development*, July 2004, Vol. XIII, No. 1

¹⁶ Yoder, R. 2002. Farmer Managed Irrigation Systems and Subsistence Agriculture in Nepal. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

¹⁷ Shivakoti, G. P. 2005. Responding to the Challenges of Asian Irrigation in Transition. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems and Governance Alternatives', proceedings of the Third International Seminar held on 9-10 September 2004, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

Nepalese agriculture is still characterized as subsistence type where farm families produce or are able to produce just enough to feed the family working on the farm. In other terms, socioeconomic and biophysical conditions prevent the production of more. These conditions mainly include their lower access to livelihood assets such as human, natural, physical, financial and social. A livelihood study conducted in two FMISs of the Chitwan district of Nepal indicated that the transformation from subsistence to commercialized production, through irrigation, is possible with the increased access of farm households to livelihood assets together with appropriate transforming processes (policies, acts, regulations, programs and governance rules) and structures (organizations or agencies).¹⁸ With the enhanced access to these assets and support services, the farm households in these FMISs were found to have been able to produce surplus foods to be traded in the local and distant markets, establish agro-based industries within and in the vicinity of the command area, create a labor market within the command area and, to some extent, have begun mechanization to increase land and labor productivity and to address rising labor scarcity problems.

With landholding shrinking and water supplies increasingly diverted to drinking and municipal uses, measures to move FMISs beyond subsistence agriculture and to access market opportunities should be made a priority. This generally includes higher value production, linking production with the market, post-harvest handling, storage, processing, and transport and marketing issues.¹⁹ The other challenges are the need for the frequent repair and maintenance of the system in contrast to reduced labor contribution and public support. The possible solution could be increased economic and financial participation, but the problem revolves around farmers' constraints of cash availability. For this, public intervention agencies could initiate subsistence farmers-targeted, cash-generating, locally-based activities.

¹⁸ Shrestha, S. G. and Shivakoti, G. P. 2004. Livelihood Asset Pentagon to Assess the Performance of an Irrigation System. *Asia Pacific Journal of Rural Development*, July 2004, Vol. XIII, No. 1

¹⁹ *Ibid*; Yoder, R. 2002. Farmer Managed Irrigation Systems and Subsistence Agriculture in Nepal. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

Finally, the implications of agricultural transformation are: the increased demand for irrigation infrastructures that enable irrigators to control the amount and the time of water use for commercialized agriculture – and the higher cost of production associated with the higher cost involved in irrigation system development and management. Thus, the possible solution is to promote or create a favorable environment for agricultural commercialization through the changes made in infrastructure and management, which respond to the needs of commercial crops with increased access to livelihood capitals in order to transform subsistence to commercialized agriculture.

Linking Policy with Local Context

In order to deal with changing policies, institutions, and governance challenges of irrigation, it is necessary to assist WUAs in developing: (i) coping mechanisms under changing contexts; (b) alternate O&M Mechanisms; and, (c) changed participation and financing issues. In order to sustain these mechanisms, other equally important issues are: (d) farmers-to-farmers peer training approaches as an alternative intervention strategy; and, (e) maintaining sustainable irrigation water use efficiency.

Governance Change and Coping Mechanisms: Local Multifunctional Cooperatives

In the present context, it is more important to examine what changes are made in organizations in the irrigation sector and what kinds of organizational changes may be needed to support IMT and to ensure the sustainable productivity of irrigation systems. Among other issues, the creation and strengthening of water users' associations (WUAs) is of utmost importance. It is important to determine whether WUAs take on tasks other than water service provision, and what is the record of multifunctional WUAs compared to single purpose, water-focused WUAs.

The issue of the multi-functionality of WUAs has been gaining attention during international conferences, and a number of interesting questions are

being put forward.²⁰ They are: should the mandate of WUAs restrict them to just the water service? Or should WUAs be allowed to develop other sources of income and other types of activities? The latter is the normal course of action of many WUAs. What does experience show? Are multifunctional WUAs less robust than single purpose ones and do they maintain the infrastructure less well?

There is emphasis from social science researchers that irrigation-based WUAs should deal with water management as primary function, but that it is necessary to diversify organizational activity.²¹ The provision of multi-services would in theory strengthen WUAs and assist in their sustainability through the build-up of necessary finance to manage irrigation system as well as organization.

In many countries, WUAs are working as multifunctional cooperatives. In the northern provinces of Vietnam, for example, the cooperatives are multifunctional and they also deal with hydro electricity.²² In some parts of Nepal, we can see examples of WUAs diversifying their activities in consideration of the changed context.²³ In addition to supplying water, WUAs promote its increased production and facilitate marketing of the produce at a profitable price. In return, the WUA receives a commission on sales besides a subscription from members. The experience suggests that the factors that make WUAs sustainable in the long run are financial autonomy, multipurpose activities, and strong leadership.

²⁰ FAO.2002. International E-mail Conference on Irrigation Management Transfer; Theme 2: IMT and Organizational Change. Accessed on July 26, 2006 at http://www.fao.org/AG/AGL/aglw/waterinstitutions/theno_otez.stm

²¹ Turrall, H. 1995. Devolution of management in public irrigation systems: Cost sharing, empowering and performance-A review. Working Paper No 80, Overseas Development Institute, London.

²² Plusquellec H. 2006. The search for a PIM model for Vietnam: Cooperative user group or a reform of governance. International Network on Participatory Irrigation Management. Accessed on July 27, 2006 at <http://files.inpim.org/Documents/pimvietnam.pdf>;

²³ Magarati, K. K. 2003. A comparative study of multipurpose and single purpose water user groups in Chitwan District of Nepal. M Sc Thesis. Asian Institute of Technology: Thailand.

Farmers-to-Farmer Peer Training Approach

The Water and Energy Commission Secretariat and the International Irrigation Management Institute (WECS/IIMI) of Nepal initiated an intervention project to assist 19 farmer-managed irrigation systems located in the Indrawati watershed in Nepal in 1985. The WECS/IIMI developed an ingenious intervention program, which had a number of relatively innovative aspects to it. Later, the WECS/IIMI²⁴ identified that the water users of the systems selected for assistance did not function as organized bodies in the management, operation and maintenance activities of their canals. Thus, farmer training for irrigation management in each system was identified as a priority for the implementation of the project. Members of the project decided to try a series of farmer-to-farmer training tours as a method of extending ideas about effective governance and management of irrigation systems.

The purpose of the farmer-to-farmer training program was to stimulate the transfer of experience from farmers in well managed systems to those in poorly managed systems through site visits, informal exchanges, and guided discussions. The project organized farmer-to-farmer training for five groups of farmers from these 19 irrigation systems, with each group consisting of 15 farmers. Each group was accompanied by two facilitators, one of whom was a member of a host system and the other a research assistant who was hired by WECS/IIMI for the project period. The host farmers from the well-managed system also worked as consultants. These consultant-farmers also inspected the canals and structures of the systems and discussed the similarities and differences in their own systems and made suggestions for improvements.²⁵ Since then, there have been numerous efforts, initiated by several GOs and NGOs in several countries, to facilitate peer training through system-level tours, visits and interactions.

²⁴ WECS/IIMI. 1990. Assistance to Farmer-Managed Irrigation Systems: Results, Lessons, and Recommendations from an Action-Research Project. Colombo, Sri Lanka: IIMI.

²⁵ Lam, W.F and G. P. Shivakoti 2002. Farmer-to-farmer training as an alternative intervention strategy. In Shivakoti and Ostrom (ed). *Improving Irrigation Governance and Management in Nepal*. California: Oakland. ICS Press.

O&M mechanisms: Changed Participation, Targeted Credit, and Benefit Sharing

The operation and maintenance (O&M) activities of irrigation systems require the direct participation as well as resource contribution from its users. However, in the changing context both users' participation and resource mobilization criteria are changing. Efforts to increase user participation have been spurred by poor performance in the efficiency, equity, cost recovery, and the accountability of many large irrigation systems managed by government agencies. Greater participation by farmers through water users associations has helped overcome many of these problems.

Financing is an important and difficult issue when we consider the O&M of management transferred systems (mainly). It relates to the constrained capacity of government to pay for the O&M of irrigation systems. To address these aspects it is necessary to have knowledge of issues like: how was irrigation O&M, rehabilitation and modernization financed prior to transfer? And what recommendations does one have for how the irrigation sector should be financed after irrigation management transfer?

Cases of financing through targeted credit are documented from different countries. In the case of Brazil, private individuals or companies have developed the majority of irrigation areas. Private developments have received technical support from the government, especially under the PROVARZEAS program and financial assistance through targeted credit lines. It comprises many forms of irrigation ranging from small to large-scale, and from simple to highly sophisticated forms of irrigation.²⁶ The Irrigation Law and its regulations provide for the cost recovery of investment and operation and maintenance (O&M) costs of government-supported irrigation projects through water charges on beneficiaries.

Benefit sharing is another important aspect of sustainable O&M, which ensures the increased participation of users. Benefit sharing mechanisms and

²⁶ FAO. 2000. AQUASTAT: FAO's Information System on Water and Agriculture, Brazil. Food and Agriculture Organization of the United Nations, Rome.

instruments consist of a broad range of approaches ranging from regulatory and market instruments, education and awareness building activities, to the development of new institutional arrangements and participatory approaches. These mechanisms are not mutually exclusive. Rather, they seem to work best when different instruments are used in combination, and applied simultaneously at different scales.²⁷

Similarly, the futile negotiation processes over water allocation and related disputes over water rights in the Euphrates-Tigris river basin, demonstrate that there is a need to create new cooperative frameworks that enable links between cooperation and development. In considering the limitations and shortcomings of existing water allocation mechanisms, Kibaroglu puts forward a more workable solution of “sharing the benefits rather than sharing the water itself.”

Crops/Drops of Water –Agricultural Research and Irrigation

As a means for meeting scarcity and competing use of water in different sectors, the issue over the productivity of irrigation water has attracted growing attention in recent times; water can be engineered so that higher returns to water use are achieved. “More crop per drop” (IIMI 1996) – the mission statement of the International Irrigation Management Institute – captures this principle well.²⁸ The prudent use of water allows more people to participate in productive agriculture whilst reducing the quantities of water being diverted for irrigation. Accordingly, producing “more per drop” can release water for other purposes.²⁹

Emergence of Methodological Approaches for Policy Feed-back

In the past, irrigation and water resource-related research mostly focused on the use and efficiency of water resources. Generally, the focus lay on water as a

²⁷ FAO. 2002. Land-Water Linkages in Rural Watersheds. FAO Land and Water Bulletin 9. Food and Agriculture Organization of the United Nations, Rome.

²⁸ IIMI. 1996. Mission statement of the International Irrigation Management Institute, Colombo: IIMI.

²⁹ Kandiah, A. 2000. IPTRID facing the challenges of the 21st Century. GRID Issue 15, International Programme for Technology and Research in Irrigation and Drainage (IPTRID), FAO: Rome.

resource for multifunctional use. However, in recent decades, irrigation management reform and the impact/effects of different interventions has been a growing matter of concern for scholars. A large number of studies can be found in these areas. A synthesis of a brief review on emerging research methods is provided below, focusing on the integration of issues in regard to irrigation management policies, institutions and governance.

Dynamics Study with Cross-sectional Data

Generally, the study of dynamic aspects requires a large set of time series data. But in order to study the micro- and field-level *per se* at the level of irrigation systems, scholars may be constrained by the unavailability of data sets. It is often not possible to get time series data sets for institutional and management-related aspects at the system level. However, it is possible to study the dynamic aspects of the evolution of irrigation policy and institutions through the analysis of cross-sectional data. To deal with such problems, scholars from The University of Hong Kong and the Asian Institute of Technology, Thailand, have devised an approach trying to capture the dynamism of irrigation management with the change in macro-level political, economic and social settings.³⁰ The current research project, “Asian Irrigation Institutions and Systems (AIIS) Dynamics study and Database Management,” compares the evolution of irrigation policy and institutions in Nepal, Taiwan and Thailand.

This broad study covers three countries: Nepal, Thailand and Taiwan. These countries represent three different levels of economic development; Nepal still being at an underdeveloped stage of economic growth; Thailand represents characteristics of a developing economy, while Taiwan is comparatively at the stage of full economic development. These stages of economic development can be considered as a proxy for time, with Nepal representing development parameters typical of at least a few decades behind that of Taiwan. Accordingly, Taiwan represents the present context with Thailand lying somewhere in between. According to this format, we have collected information on irrigation

³⁰ Shivakoti, G. P. and R. C. Bastakoti. 2006. The robustness of Montane irrigation systems of Thailand in a dynamic human-water resources interface. *Journal of Institutional Economics*. 2 (2):1-26.

institutions, management and other aspects. This study aims to establish an Asian Irrigation Institutions and Systems (AIIS) database by converting earlier Nepal Irrigation Institutions and Systems (NIIS) coding form³¹ into a more general framework to fit in with the Asian multi-country setting. With the help of cross-sectional data, we are trying to analyze the evolution of irrigation institutions with respect to the development of national economy. It is hoped that the findings from the study will be able to capture the dynamism of institutional evolution across this region, and ultimately that the research results will be able to provide feedback to the policy arena.

Integration of Hydrological Boundaries with Political Boundaries

In the past, many conventional studies of irrigation management focused either on hydrological boundaries or on political boundaries as study units. We can find several examples of previous studies, which mainly concentrated on selecting irrigation systems from administratively demarcated boundaries. Such studies basically considered the appropriation aspects without due attention to resource characteristics and resource boundaries. A more effective strategy would be to integrate the hydrological boundary with the political one. Such an approach would allow us to capture both the characteristics of water resources and human/management factors.

Many resources – in particular water resources – follow certain natural boundaries in the form of river basins at macro level and small comparable watersheds at micro/meso levels. The political and/or administrative divisions/boundaries alone cannot capture well the characteristics of such kinds of resources. The natural course of water resources significantly influences the provision of water for agricultural and other uses. And similarly, the systems and water use in different ecological regions vary significantly. For example, hilly areas require different provision mechanisms compared to plain areas. Appropriation infrastructures also differ across different ecological regions.

³¹ Ostrom, E., D.W. F. Lam and M.S. Lee 1994. The Performance of self-governing irrigation systems in Nepal. *Human Systems Management* 13, no. 3: 197-207.

The characteristics of water resources (source of water rather than only canal infrastructure and coverage) significantly influence the management and institutional aspects of irrigation. Considering this issue, we have tried to integrate hydrological boundaries (river basins) with administrative/political boundaries (regions) and ecological boundaries in our ongoing study.³² Using this approach, we have divided Nepal, Thailand and Taiwan into comparable ecological regions and also focused on the major river basins. The underlying idea in this approach is that we can better capture resource use dynamics, and ultimately their management and institutional aspects, if we are able to integrate the natural boundaries of resources with administrative ones.

Analyzing the Effect of Intervention over Time

Many studies on common pool resources – in particular studies on water resource management – have focused on assessing the direct effect of different kinds of interventions aimed at improving resource characteristics and facilitating provision mechanisms. It is easy to compare the direct effect of any intervention (immediately before and after intervention) by comparing several basic indicators like immediate change in participation, resource mobilization, crop productivity and cropping intensity at the head and tail end of the system as well as during the dry season. But, only a few studies have adopted such approaches that are able to examine interactive effects in the long-run.

Our earlier study focused in answering such issues as whether and how the WECS/IIMI intervention affected performance.³³ Later we analyzed the interactive effect of intervention on agricultural productivity and irrigation

³² Shivakoti, G. P. and R. C. Bastakoti. 2006. Understanding institutional dynamics and performance of irrigation systems: Some methodological considerations. Paper presented at the Fourth International Seminar on “Irrigation in Transition: Interacting with Internal and External Factors and Setting the Strategic Actions” organized by Farmer Managed Irrigation Systems Promotion Trust to be held at Kathmandu, Nepal during 6-7 November, 2006.

³³ Lam, W.F and G. P. Shivakoti 2002. Farmer-to-farmer training as an alternative intervention strategy. In Shivakoit and Ostrom (ed). *Improving Irrigation Governance and Management in Nepal*. California: Oakland. ICS Press.

management in the long-term.³⁴ The study was made based on an in-depth analysis of the long-term effect of WECS/IIMI intervention on 19 irrigation systems in the Indrawati watershed in Nepal. They used three-time slice data for analysis: before intervention, and two periods after intervention (with one recent time data collection).

Shivakoti and Bastakoti³⁵ analyzed the dynamism in the resource use pattern by examining the changes in the institutional arrangements within Socio-Ecological Systems (SES). In the context of changing governance mechanisms and the evolution of technological and market forces, they examined the dynamism and robustness of two irrigation systems within the Kok River system in the Mekong River basin in northern Thailand. The paper analyzed both the temporal and spatial dynamism of the irrigation systems. The temporal dynamism was analyzed over three time periods: before intervention; initial operation; and long-term. The study used both primary and secondary data for analyzing the temporal and spatial dynamism of irrigation systems. For this, they used three- time slice data taken during different periods.

Livelihood Asset Pentagon: Analytical Framework for Irrigation System Performance Assessment

Traditionally, a large number of studies have focused on the assessment of irrigation system performance. Most of these conventional studies assessed irrigation system performance, considering factors endogenous to an irrigation system. The conventional approach to water scarcity overlooks several livelihood aspects to which irrigation is closely tied.

Shivakoti and Shrestha³⁶ identified grossly overlooked but crucial livelihood factors that influence the performance of irrigation systems, and developed a

³⁴ Lam, W. F., E. Ostrom, G. Shivakoti, and R. Yoder. 2005. Designing Effective Intervention for Irrigation Management: Cases from the Indrawati Watershed in Nepal. Paper prepared for the "Festschrift for Elinor Ostrom", November 22-24, 2005, Indiana University, Bloomington.

³⁵ Shivakoti, G. P. and R. C. Bastakoti. 2006. The robustness of Montane irrigation systems of Thailand in a dynamic human-water resources interface. *Journal of Institutional Economics*. 2 (2):1-26.

³⁶ Shivakoti, G. P., and S. G. Shrestha. 2005. Analysis of Livelihood Asset Pentagon to Assess the Performance of Irrigation Systems Part 1 – Analytical Framework. *Water International*, 30 (3):356-362.

framework of analysis. They considered five fundamental livelihood assets: human capital, natural capital, physical capital, financial capital and social capital. The other livelihood aspects related to performance of an irrigation system were vulnerability context, transforming structures and processes, and livelihood strategies.

Subsequently, Shivakoti and Shresth³⁷ identified the most significant livelihood variables, which can be used to reliably and comprehensively assess the overall performance of irrigation systems. Those variables are: economically active residents population; water adequacy both at field level and at source; natural capital index; access to road and processing facility indices; off- and non-farm and total cash incomes; irrigation equity; irrigation management and social capital indices.

Challenges Ahead

Irrigated agriculture has been a major factor of development during the past several centuries. However, as we face the new millennium, irrigation management has started to face substantial changes in regard to: (1) agricultural practices, (2) life in rural societies, (3) the economies of countryside, and (4) the relationship of governments and private sectors. These major challenges will generate increased pressure for new policy goals for irrigation.³⁸ In many respects, the earlier focus on physical capital, top-down governance, and “patronage with participation,” will need to shift to the recognition that social capital is essential, that polycentric governance systems are more responsive, and that irrigation systems based on “partnership with empowerment” are more likely to meet future needs.

³⁷ Shivakoti, G. P., and S. G. Shrestha. 2005. Analysis of Livelihood Asset Pentagon to Assess the Performance of Irrigation Systems Part 1 – Application of Analytical Framework. *Water International*, 30 (3):363-371.

³⁸ Vermillion, D. L., E. Ostrom, and R. Yoder. 2005. The Future of Irrigated Agriculture in Asia: What the Twenty-First Century Will Require of Policies, Institutions, and Governance. In Shivakoti et al. (Eds), *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.

With the changing context, agricultural practices will also change. For centuries, the majority of irrigation water has been utilized for the production of cereal grain. Prices for grain dropped by a half in the 1980s due to increased productivity after the adoption of green revolution technologies, the reduction in demand for rice due to the general increase in incomes, and following subsidies given by the governments of developed countries to their own agricultural sectors.³⁹ Therefore, water resource policies should encourage diversification of agricultural products, which will generate a demand for water at different times of the year. The coordination of water supply to irrigation canals will be more challenging, and more farmers will rely on ground water, which can be made available when their crops are in need of water.

The rising competition and conflicting use increases water scarcity. These issues are affecting major drinking water projects, and irrigation expansion is being debated both at the local level and in the policy arena. Thus, making policy responsive to the multiplicity of uses and new demands of water is very much an immediate necessity. Another challenge, which irrigated agriculture needs to come to grips with, is the quality of water. Global warming and climate change have deteriorated water quality, so ultimately reducing the available amount of water to agriculture – this effect will even impact rural Nepal in the near future.

The integration of water-, land-, and forest-related issues is another future challenge. Forest use, land use and water availability are directly related issues. The permanent loss of forest land and forest cover leads to the degradation of watershed conditions. Thus, forest cover change has long-term adverse effects on water quality. Agricultural land use and land cover changes also have an affect on water use and availability.

These changes in agriculture, rural society, and the economy at large, will stimulate changes in governance systems and the relationship between governments and the private sector. A key to effective transition is changing the

³⁹ Barker, R., and F. Molle. 2005. Perspectives on Asian Irrigation. In Shivakoti et al. (Eds), *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.

concept of government to that of governance. This requires recognizing that it is not just national governments that are crucial to building more efficient, responsive, equitable, and resilient societies. Top-down centralized policies have frequently failed in past. In future, governance systems will have to develop away from monocentric structures toward polycentric ones. Polycentric governance systems enable the creation of governance units that match decision-making units with hydraulic units. These systems will, however, face substantial pressures to achieve new policy goals for irrigation.⁴⁰

Another important challenge lies in the proper understanding of the reasons and consequences of past reforms and intervention processes. The use of appropriate and innovative methodological approaches is also a future necessity; if we can devise and use effective methodology for studying different aspects of irrigation management, it can significantly assist in formulating better policy backed up by useful information.

If we examine the problems from a comprehensive perspective, then the current challenges for sustainable irrigation development include, watershed degradation, eroding social capital and the subsistence nature of agriculture. The realization of the values and virtues of watershed development and management at basin and regional levels (and sharing the benefits of water resource uses) is a prerequisite for the sustainable solution to irrigation development. Social capitals that once enabled communities to develop and manage several irrigation systems on a sustainable basis for centuries are now eroding. Therefore, means to integrating social and economic participation together with the improvement in physical capital should be sought in order to sustain irrigation systems both productively and efficiently. Similarly, changes should be made to infrastructure and management so that they respond to the needs of commercial crops – together with the increased access to livelihood capitals this will assist the transition from subsistence to commercialized agriculture. Finally, a

⁴⁰ Vermillion, D. L., E. Ostrom, and R. Yoder. 2005. *The Future of Irrigated Agriculture in Asia: What the Twenty-First Century Will Require of Policies, Institutions, and Governance*. In Shivakoti et al. (Eds), *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.

socioeconomic, geopolitical and policy environment that enhances the benefit-sharing of water resource uses together with the development and management of watersheds should also be promoted.

References

- Barker, R., and F. Molle. 2005. Perspectives on Asian Irrigation. In Shivakoti et al. (Eds), *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.
- Coward, E. W. 1980. *Irrigation and Agricultural Development in Asia: Perspectives from the Social Sciences*. Ithaca, NY: Cornell University Press.
- FAO. 2000. AQUASTAT: FAO's Information System on Water and Agriculture, Brazil. Food and Agriculture Organization of the United Nations, Rome.
- FAO. 2002. International E-mail Conference on Irrigation Management Transfer; Theme 2: IMT and Organizational Change. Accessed on July 26, 2006 at <http://www.fao.org/AG/AGL/aglw/waterinstitutions/thenote2.stm>
- FAO. 2002. Land-Water Linkages in Rural Watersheds. FAO Land and Water Bulletin 9. Food and Agriculture Organization of the United Nations, Rome.
- IIMI. 1996. Mission statement of the International Irrigation Management Institute, Colombo: IIMI.
- Kandiah, A. 2000. IPTRID facing the challenges of the 21st Century. GRID Issue 15, International Programme for Technology and Research in Irrigation and Drainage (IPTRID), FAO: Rome.
- Khanal, R. R. 1982. *Muluki Ain Kehi Bibechana* (in Nepali language). Sajha Prakashan Press, Lalitpur, Nepal.
- Lam, W.F. 1998. *Governing Irrigation Systems in Nepal: Institutions, Infrastructure, and Collective Action*. Oakland, CA: ICS Press.
- Lam, W. F. 1996. Institutional design of public agencies and coproduction: A study of irrigation associations in Taiwan. *World Development*, 24(6):1039 – 1054.
- Lam, W. F., E. Ostrom, G. Shivakoti, and R. Yoder. 2005. Designing Effective Intervention for Irrigation Management: Cases from the Indrawati Watershed

in Nepal. Paper prepared for the “Festschrift for Elinor Ostrom”, November 22-24, 2005, Indiana University, Bloomington.

- Lam, W.F and G. P. Shivakoti 2002. Farmer-to-farmer training as an alternative intervention strategy. In Shivakoti and Ostrom (ed). *Improving Irrigation Governance and Management in Nepal*. California:Oakland. ICS Press.
- Magarati, K. K. 2003. A comparative study of multipurpose and single purpose water user groups in Chitwan District of Nepal. M Sc Thesis. Asian Institute of Technology: Thailand.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Ostrom, E. 1992. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco: ICS Press.
- Ostrom, E. 2002. How Farmer Managed Irrigation Systems Build Social Capital to Outperform Agency Managed Systems that Rely Primarily on Physical Capital. In: Prachanda Pradhan and U. Gautam (eds.) ‘Farmer Managed Irrigation Systems in the Changed Context’, proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.
- Ostrom, E. 2005. *Understanding Institutional Diversity*. Princeton, New Jersey: Princeton University Press.
- Ostrom, E., D.W. F. Lam and M.S. Lee 1994. The Performance of self-governing irrigation systems in Nepal. *Human Systems Management* 13, no. 3: 197-207.
- Plusquellec H. 2006. The search for a PIM model for Vietnam: Cooperative user group or a reform of governance. International Network on Participatory Irrigation Management. Accessed on July 27, 2006 at <http://files.inpim.org/Documents/pimvietnam.pdf> .
- Samad, M. 2001. Impact of irrigation management transfer on the performance of irrigation systems: A review of selected Asian experiences. Paper presented at the ACIAR Water Policy Workshop, 8-9 June 2001, Bangkok, Thailand.

- Shivakoti, G. P. 2002. Intervention in Montane Farmer Managed Irrigation Systems of Thailand and Vietnam: How Participatory and Dynamic are the Process? In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.
- Shivakoti, G. and E. Ostrom (ed). 2002. *Improving Irrigation Governance and Management in Nepal*. Oakland: California, ICS Press.
- Shivakoti, G. P. 2005. Responding to the Challenges of Asian Irrigation in Transition. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer Managed Irrigation Systems and Governance Alternatives', proceedings of the Third International Seminar held on 9-10 September 2004, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.
- Shivakoti, G. P., and S. G. Shrestha. 2005. Analysis of Livelihood Asset Pentagon to Assess the Performance of Irrigation Systems Part 1 – Analytical Framework. *Water International*, 30 (3):356–362.
- Shivakoti, G. P., and S. G. Shrestha. 2005. Analysis of Livelihood Asset Pentagon to Assess the Performance of Irrigation Systems Part 1 – Application of Analytical Framework. *Water International*, 30 (3):363-371.
- Shivakoti, G. P. and R. C. Bastakoti. 2006. The robustness of Montane irrigation systems of Thailand in a dynamic human-water resources interface. *Journal of Institutional Economics*. 2 (2):1-26.
- Shivakoti, G. P. and R. C. Bastakoti. 2006. Understanding institutional dynamics and performance of irrigation systems: Some methodological considerations. Paper presented at the Fourth International Seminar on "Irrigation in Transition: Interacting with Internal and External Factors and Setting the Strategic Actions" organized by Farmer Managed Irrigation Systems Promotion Trust to be held at Kathmandu, Nepal during 6-7 November, 2006.

- Shivakoti, G. P., D. L. Vermillion, W. F. Lam, E. Ostrom, U. Pradhan, and R. Yoder (Eds). 2005. *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.
- Shrestha, S. G. 2004. *Irrigation System Performance Indicators in Relation to Farm Livelihoods in Chitwan, Nepal*. Doctorate degree dissertation submitted to Asian Institute of Technology (AIT), School of Environment, Resources and Development, Thailand. AIT, Thailand.
- Shrestha, S. G. and Shivakoti, G. P. 2004. *Livelihood Asset Pentagon to Assess the Performance of an Irrigation System*. *Asia Pacific Journal of Rural Development*, July 2004, Vol. XIII, No. 1.
- Turrall, H. 1995. *Devolution of management in public irrigation systems: Cost sharing, empowering and performance-A review*. Working Paper No 80, Overseas Development Institute, London.
- Uphoff, N. 1986. *Improving International Irrigation Management with Farmer Participation: Getting the Process Right*. Boulder, Colorado: Westview Press.
- Vermillion, D. L. 1997. *Impacts of management transfer: A review of the evidence*. Research Report II. Colombo, Sri Lanka: International Irrigation Management Institute.
- Vermillion, D. L., E. Ostrom, and R. Yoder. 2005. *The Future of Irrigated Agriculture in Asia: What the Twenty-First Century Will Require of Policies, Institutions, and Governance*. In Shivakoti et al. (Eds), *Asian Irrigation in Transition: Responding to Challenges*. India, New Delhi: Sage Publications India.
- WECS (Water and Energy Commission Secretariat). 2002. *Water Resources Strategy: Nepal*. WECS, Kathmandu, Nepal.
- WECS/IIMI. 1990. *Assistance to Farmer-Managed Irrigation Systems: Results, Lessons, and Recommendations from an Action-Research Project*. Colombo, Sri Lanka: IIMI.
- Yoder, R. 2002. *Farmer Managed Irrigation Systems and Subsistence Agriculture in Nepal*. In: Prachanda Pradhan and U. Gautam (eds.) 'Farmer

Managed Irrigation Systems in the Changed Context', proceedings of the Second International Seminar held on 16-19 April 2002, Kathmandu, Nepal. Farmer Managed Irrigation Systems Promotion Trust, Kathmandu, Nepal.

IV. The Mahakali River Treaty: Applying a New Lens to Past Efforts for Future Success

Glen Hearn¹

Abstract

Great degrees of cooperation are required in international basins, such as the Ganges, where the effects of climate change and increasing demands on water resources will make it challenging to ensure local needs are met. Despite the potential benefits associated with the Mahakali Treaty, a decade after coming into force not a sod has been turned to construct the multipurpose Pancheshwar Dam. This paper analyses the failure of implementing the Mahakali Treaty, focussing on the lack of process mechanisms used to enhance cooperation between Nepal and India leading up to the treaty, and suggests potential avenues for future engagement there and elsewhere.

Introduction

Much of the world's 263 international basins lack any type of joint management structure, and certain fundamental management components are noticeably absent from those that do.² Effective and adaptive management of international water resources will be critical to mitigate climate change and balance greater demands placed on increasingly scarce water resources, particularly in terms of agricultural needs.³ The major obstacles are not generally technical in nature, and there is convergence among scholars and practitioners alike that the greatest stumbling blocks to

¹ Mailing address, PO Box 1021, Garibaldi Highlands, British Columbia, Canada V0N 1T0 Telephone, 604-505-6609; Email, g_hearns@interchange.ubc.ca

² Giordano, M. A. and A. T. Wolf (2003) Sharing waters, Post-Rio international water management, *Natural Resources Forum*, 27, pp. 163-171.

³ Brown, L. (2003) The effects of emerging water shortages on food in: A. M. and R. Jehl (Eds) *Who's water is it?* (Washington, National Geographic).

regime development and cooperation are political.⁴ Case study analysis of international river basins has identified several key process mechanisms that promote cooperation and regime building in international waters.⁵ These include balancing incentives, information exchange, stepwise cooperation, third party involvement, and engaging relevant stakeholders. In the past, these mechanisms have evolved through an organic process of trial and error principally driven by needs. In some instances, for instance in Europe, cooperation has emerged over centuries of small incremental developments. Many international basins do not now have the luxury to evolve cooperation over long periods of time. To develop functional cooperation rapidly, strategies are needed for regime building that accelerates the development of adaptable institutions.

Focus for such strategies should be on those process mechanisms that address regime objectives to increase equity, reduce problem uncertainty, increase trust, minimise cost, increase technical capacity, and increase approval from other stakeholders.

One of the regions in the world where cooperation may be most acute in adapting to future needs regarding water resources is South Asia. This paper takes a retrospective look at how process mechanisms were used in the development of the Mahakali Treaty, between India and Nepal, and suggests ways for the future.

Background

The 'Treaty Between His Majesty's Government of Nepal and the Government of India Concerning the Integrated Development of the Mahakali River Including the Sarada Barrage, Tanakpur Barrage and Pancheshwar Project' (hereafter referred to as the Mahakali Treaty) was signed on 12th February 2006, and entered into force the 5th June later that

⁴ Bernauer, T. (2002) Explaining success and failure in international river management *Aquatic Sciences*, 64, pp. 1-19; Sadoff, C. and D. Grey (2002) Beyond the river, the benefits of cooperation on international rivers *Water Policy* 4, (5), pp. 389-403.

⁵ Paisley, R. and G. Hearn. (2006) Some Observations from Recent Experiences with the Governance of International Drainage Basins, in: A. C. Corr ea and G. Eckstien (Eds.) *Precious, Worthless or Immeasurable, the Value and Ethics of Water*. Vol 2 Symposium Proceedings of the Texas Tech Law Review, November, 2006, Lubbock, Texas.

year.⁶ As its name suggests, the treaty concerned the operation and augmentation of two existing facilities, the Sarada (1928) and Tanakpur (1989) barrages, and the future construction of a large multi-purpose dam, the Pancheshwar project. Following the Koshi, Gandak and Chandra infrastructure agreements, the Mahakali Treaty was the first, and so far only, agreement between the two nations for the joint development of dams spanning their border.

The water of Nepal is important, while occupying only 13% of the Ganges basin, it supplies about 47% of its water.⁷ The total size of the Mahakali River catchment is 12,100 km², 80% of which lies in India and the remainder in Nepal.⁸ It is the fourth largest river flowing from Nepal into the Ganges system, with an annual flow of 658 m³/s contributing about 6% of the total Ganges flow. While still in the mountains, it forms the border between India to the west and Nepal to the east for 230 km. Upon reaching the Ganges plains, just above the town of Tanakpur, in what is now Uttaranchal province, it flows completely into India for some 15 km before flowing back into Nepal, and then again into Indian territory (Figure 1). The area where the river criss-crosses between the two nations has historically posed problems in terms of control and use.⁹

The Treaty was concluded within four months of official negotiations.¹⁰ However, the apparent rapidity of its drafting is in stark contrast to the implementation of its provisions; a decade later most of what was called for in the treaty has not even begun to be realised.

⁶ *Treaty Between His Majesty's Government of Nepal and the Government of India Concerning the Integrated Development of the Mahakali River Including the Sarada Barrage, Tanakpur Barrage and Pancheshwar Project*. February 12, 1996. New Delhi, 36 ILM 531 (1997).

⁷ Dhungel, D. and Pun, S. (2005) Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals. *Ben-org*. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc

⁸ Rahaman, M. M. (2005) *Integrated Water Resources Management in the Ganges Basin, Constraints and Opportunities*, Licentiate of Technology, Department of Civil and Environmental Engineering, Helsinki University of Technology. Espoo. 90 pages. Retrieved September 12, 2006, <http://www.water.tkk.fi/wr/tutkimus/thesis/Rahaman2005.pdf>

⁹ Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang); Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia); Radio Nepal (2005,) Nepal, India discuss water sharing at Tanakpur barrage. *BBC Monitoring South Asia*, March 17, 2005, Retrieved August 12, 2006, from web.lexus-nexus.com/documents/.

¹⁰ *Ibid.* (Marty 2001)

The Treaty

The Mahakali Treaty is equitable in terms of power generation at Pancheshwar (Article 3); contains modest consideration for in-stream flows (Article 1); takes into account seasonal variability (Articles 1, 2, and 3); provides for a joint river commission with strong recommendation powers 'guided by the principles of equity, mutual benefit and no harm to either Party' (Article 9); has an eloquent dispute resolution mechanism (Article 11); and is accommodating with respect to local users and their water needs (Article 7). It is somewhat flexible in that either party is able to provoke a review of allocations at 10-year intervals, and it supposed to be in effect for 75 years upon ratification (Article 12).

The principle benefits prompting the Mahakali Treaty were irrigation, power generation and flood control. The area up stream of Tanakpur (Figure 1) was noted for its hydropower potential as early as 1956 when the Indian Central Water and Power Commission carried out assessments of the area.¹¹ The site was further investigated by the Irrigation Department of Uttar Pradesh, in 1962 and again by the Water Power Consultancy in 1971, who recommended the largest dam in Asia be built across the river.¹²

Amongst other things, the Mahakali Treaty called for the creation of the Mahakali River Commission (MRC). This was to be a joint coordinating body guided by the principles of equality, mutual benefit and no harm to either party. The MRC was to make recommendations for conservation and utilization of the waters, coordinate plans of actions, provide expert evaluation of the projects, and examine any differences that arise between the parties over the application of the treaty (Article 9). However, despite promotion from India in 1997, the Mahakali River Commission has yet to be created.¹³

¹¹ *Ibid.*

¹² Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March); Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang).

¹³ Sen, A. (2004) Finding Common Ground Between India and Nepal, Mahakali Treaty and Pancheshwar Project, *Net-edition The Financial Express*, May 1, 2004. Retrieved August 10, 2006, from www.financialexpress.com/fe_full_story.php?content_id=58182

The drafters and negotiators of the treaty attempted to put to rest several issues in a single agreement. Under an agreement made between British India and Nepal in 1920, the Sarada barrage was to provide water to Nepal as well as northern parts of India now known as Uttar Pradesh.¹⁴ It was completed in 1928 and lies just 6 km inside Indian Territory (Figure 1). The barrage supplies water for irrigation, principally for the Sarada Irrigation Project in India, but is also available to Nepal. Knowing that the age of the Sarada barrage compromised its future ability to provide the quantity of water that Nepal has come to rely upon, the Mahakali Treaty is written such that Nepal would receive its due dry season flow from upstream structures should the Sarada barrage not function properly (Article 1a). This was important as Nepal had some 93,000 ha of irrigation land supplied by the Sarada barrage at the time.¹⁵ Due to the extremes between dry and wet season flows, the Sarada barrage was not capable of supplying sufficient water to the growing demand from irrigation.¹⁶

Article 2 of the Treaty deals with the Tanakpur barrage, a structure that was unilaterally constructed by India at the point where the Mahakali River enters India (Figure 1). It is both a run of the river hydropower plant and regulator for water to the Sarada Barrage.¹⁷ To reap the full benefits of the project, India needed to tie off the barrage on the other side of the river, which inconveniently belonged to Nepal. After completion in 1989 they subsequently negotiated with the Nepalese government for use of the land. An agreement was reached in 1991, and modified in Nepal's favour a year later; but neither was ever accepted in the parliament of Nepal.¹⁸ The Mahakali Treaty was, in part, intended to settle the matter of Tanakpur by

¹⁴ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia)

¹⁵ Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March).

¹⁶ Dhungel, D. and Pun, S. (2005) Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals. *Ben-org*. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc.

¹⁷ Rahaman, M. M. (2005) *Integrated Water Resources Management in the Ganges Basin, Constraints and Opportunities*, Licentiate of Technology, Department of Civil and Environmental Engineering, Helsinki University of Technology. Espoo. 90 pages. Retrieved September 12, 2006, <http://www.water.tkk.fi/wr/tutkimus/thesis/Rahaman2005.pdf>

¹⁸ Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March); Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang).

providing for the construction of the barrage across the entire river (which had already been constructed). Under the Treaty, Nepal gave an area of about 3 ha to India for this purpose in exchange for irrigation water and 70 million kilowatt-hour (energy) per annum.

In terms of Asia's 'highest dam', the Mahakali Treaty deals with the Pancheshwar project by overtly intending to produce the 'maximum total net benefits for the parties' in the form of power, irrigation and flood control (Article 3). In terms of power, there is to be equality throughout, with each country having equal generating capacity. The project is to be jointly implemented, each party will work to mobilize its own financing and pay for the costs of the project based on the benefits accruing; India paying the lion's share as it is set to receive the greatest benefits through irrigation.

The drafters of the Mahakali Treaty put forward some innovative areas for cooperation; the overt purpose of which was to maximise benefits for both parties. Why then has so little materialised or been initiated? In response, it must be determined whether the 'water' relationship between the two nations differs from the 'general' or 'overall' relationship between them. Should they mirror each other, it can be assumed that external factors have played a large role in determining hydro-politics. Should they not mirror each other, it can be assumed that there are factors specific to the hydro-politics that are reflected in the 'water' relationship alone.

The importance of process should not be underestimated. In analysing 264 environmental decisions made in the United States, Beierle and Cayford found that contextual situations had little correlation with 'success' in reaching an acceptable decision, whereas several process mechanisms correlated significantly. Surprisingly, they found that pre-existing relationships between the parties did not significantly correlate with success or failure, while process factors, such as the interest of a local lead agency and the dialogue process did correlate significantly.¹⁹

Figure 2 shows both the 'general' and 'water' relationships between India and Nepal over the last 50 years, along with water events. The period is broken

¹⁹ Beierle, T. and J. Cayford (2002) *Democracy in Practice, Public Participation in Environmental Decisions* (Washington D.C., RFF Press Book).

up into three phases, the pre-negotiation phase (1958-1978), the negotiation phase (1978-1996), and the post-treaty phase (1996-2006). It should be noted here that while the official negotiations for the treaty began in November 1995; here, the 'negotiation' process is taken to have begun in 1977-1978 when the Indian government first approached Nepal with the concept of the Pancheshwar dam.²⁰

The solid bar plot in Figure 2 represents 'water events' as determined by the Water Events Database from Oregon State University's Basins at Risk (BAR) study.²¹ The BAR scale is a constructed scale. Constructed scales allow numerical values to be associated with the extent to which certain criteria or attributes have been achieved through a qualitative assessment.²² On the BAR scale water events are rated from +7 to -7 depending on whether they represent cooperation or conflict, respectively. The signing of the Koshi or Gandak agreements score +6; while Nepal's official complaint in 2005, that India was not operating the Tanakpur barrage in an equitable manner²³ scores a -2. For the purposes of calculations, such as an average for the pre-negotiation and post-treaty phases, the event BAR scores are transposed to a logarithmic scale and transposed back after calculations. It must be mentioned that the Basin's at Risk database only reports events up to the 2000, and the events between 2000 to 2006 were evaluated and assessed by the author. For a more in-depth explanation of the BAR scale and the manipulation of data see Yoffe et al.²⁴

The 'general' relationship is determined using a constructed scale between 1-5 (Table 1) and is based on assessing the integration of basin states and the events that have taken place between them. Integration between states is one of the key elements defining functional relationships and possibility for

²⁰ Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March); Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang)

²¹ See, <http://www.transboundarywaters.orst.edu/projects/events/>.

²² von Winterfeldt, D. (1992) Expert Knowledge and Public Values in Risk Management, The Role of Decision Analysis, in: S. Krinsky and D. Golding (Eds.) *Social Theories of Risk*, (pp 321-342) (Wesport, Praeger).

²³ Radio Nepal (2005,) Nepal, India discuss water sharing at Tanakpur barrage. *BBC Monitoring South Asia*, March 17, 2005, Retrieved August 12, 2006, from web.lexus-nexus.com/documents/.

²⁴ Yoffe, S., Wolf, A. and Giordano, M. (2003). Conflict and Cooperation Over International Freshwater Resources: Indicators of Basins at Risk, *Journal of American Water Resources Association*, October pp. 1109-1126.

cooperation.²⁵ Durth suggests that when states are integrated they have cross-sectoral leveraging²⁶ which allows for greater cooperation in any one sector due to sunken costs in others. Here the constructed scale is sliding, meaning that certain estimations may fall on a continuum of values permitting greater detail.

While a decline is observed for both the general and water relationships between the pre-negotiation phase and the post-treaty phase, the decrease in the water relationship is striking and suggests a greater relative deterioration in the hydro-politics (Figure 2). Furthermore, in looking at the 'water events', the post-treaty period experienced comparatively less high positive scores as well as numerous negatives.

Here it is worth noting that basing analysis purely on the events database would be somewhat misleading. Often when diplomatic issues involve nations, points of cooperation are celebrated and promoted while discord is downplayed. News therefore from official sources, particularly dealing with agreements or cooperation are likely to focus on positive issues rather than negative. A brief qualitative review will help validate numerical values determined in Figure 2.

General or Overall Relations

Through most of the last 60 years, India and Nepal have been integrated and interdependent, at least from Nepal's perspective. The multiplicity of ties not only encompasses socio-economic, political, religious, racial, and cultural linkages, but also numerous cross-border familial bonds particularly in the Terai region in southern Nepal.²⁷ India has been, and continues to be, Nepal's greatest trading partner. In 2005, 99.7% of her imports came from India, or

²⁵ Durth, R. (1998) Transboundary Externalities and Regional Integration in W. Sheumann and M. Schiffler (Eds.) *Water in the Middle East, Potential for Conflicts and Prospects for Cooperation*. (57-69) (Amsterdam, Springer).

²⁶ Cross-sectoral leveraging refers to cooperation and established linkages in other sectors, such as agriculture, joint economic agreements, amongst others, that can influence cooperation in water or other sectors. An example would be a trade agreement for wood products that could be used to 'leverage' or influence cooperation in a water treaty, or visa versa.

²⁷ Sarkar, S. (1993) *India-Nepal relations, 1960-1991*. (Calcutta, India, Minerva Associates); Haldar, C. (2004,) A Himalayan Effort. *The Statesman*. August 30, 2004, Retrieved June 24, 2006, from web.lexus-nexus.com/universe

passed through India.²⁸ The strong linkage between the two nations is perhaps best exemplified by Article 6 of the 'Treaty of Peace and Friendship between the Government of India and the Government of Nepal', signed in 1950, which allows each others citizens to enjoy the equivalent economic status of their own nationals.²⁹ However, this exceptional degree of integration should also be assessed in light of India's concern of China's expanding influence in the region.

Nevertheless, the Indian-Nepalese Friendship Treaty paved the way for greater economic integration between the countries, and has resulted in several economic development agreements fortifying relations. In 1995, the Nepalese Rupee was tied to the Indian Rupee, and Indian Railways, the national transport carrier, extended its tracks and services to the town of Bijgunj, in Nepal, in 2004. The India-Nepal Trade Treaty was extended by another five years in 2007. There is also greater regional integration, the South Asian Growth Quadrangle (Bihar, Nepal, north-east India, Bangladesh, Bhutan Myanmar) is an attempt to integrate in a regional fashion, where Indian states, such as Bihar help drive cooperation with their neighbours.³⁰

The relationship has not been without its hiccups and low periods, however. Sandwiched between two emerging powers, Nepal also signed a peace and friendship treaty with China only ten years after signing one with India; and has received increasing support and development aid from the Chinese government.³¹ China began financing water infrastructure projects in 1967, building both the Sunkosi and Pokhara hydro-dams. Furthermore, to balance her dependence on India, Nepal began exploring alternative markets and developing economic ties with other neighbours in the late 70's.

²⁸ FNCCI (2006) Trade with India, *Federation of Nepalese Chambers of Commerce and Industry*, Retrieved January 10, 2007 from <http://www.fncci.org/indicator.php>

²⁹ *Treaty of "Peace and Friendship" between the Government of India and the Gvernment of Nepal*, 1950. July 31, 1950. Accessed June 12, 2006. http://www.humanrights.de/doc_en/archiv/n/nepal/treaty/31071950_Treaty_of_Peace_and_Friendship1950.htm

³⁰ Haldar, C. (2004,) A Himalayan Effort. *The Statesman*. August 30, 2004, Retrieved June 24, 2006, from web.lexus-nexus.com/universe

³¹ *Sino-Nepalese Treaty of Peace and Friendship*. April 28, 1960. Retrieved August 12, 2006, from http://www.humanrights.de/doc_en/archiv/n/nepal/treaty/28041960_SinoNepalese_Treaty.htm

India's response was not one of support. In 1989 she all but closed the trade routes to Nepal virtually sealing off the Himalayan Kingdom and creating havoc amongst the Kathmandu population.³² However, it is not Nepal's relationships with trade that most concerns India; but rather the increased military influence that comes with it. This concern recently prompted the Indian Defence Minister to issue a statement that "Chinese and Pakistani military assistance in Nepal is a problem that must be resolved soon."³³ However, there has been little indication of what 'resolution' would look like for India.

There has also been the long-standing issue of the Kalapni, an area of some 75 km² where China, India, and Nepal meet. The area is claimed by Nepal, but has been occupied since 1962 by India following her border war with China. To rub further salt, India and China recently concluded an agreement of their borders in this region with China recognising India's claim to Kalapni.³⁴

Relations have also been strained by incidents such as the hijacking of Indian Airlines flight CI 814 from Kathmandu on 24 December 1999, which helped perpetuate the belief in India that Nepalese Muslims in the Nepal-Terai are used as conduits by Pakistan's Inter Intelligence Service to instigate anti-Indian activities on Indian soil.³⁵ But they have also slowly deteriorated, from India's perspective, through Nepal's invitation of neighbours like Pakistan and China for support and assistance.

The instability of the Nepalese government and the civil unrest may be one of the greatest issues staining the relations between India and Nepal. Since the new constitution in 1990, which replaced the Indian friendly monarchy with a parliamentary system, Nepal has had some 12 governments, none lasting for more than two years. Furthermore, Article 127 of the constitution ensures that international projects have wide support calling for a 2/3 majority on any treaties is viewed by some as directly affronting Indian

³² Upreti, B. C. (1993) *Politics of Himalayan river waters, an analysis of the river water issues in Nepal, India and Bangladesh*. (Jaipur, India. Nirala Publications).

³³ AFP (2005). Nepal arms deals worry India, *Agence France Presse - English*, December 20 Retrieved August 12, 2006 from www.lexus-nexus.com

³⁴ BBC Worldwide, M. (2005) Nepalese paper calls for response to 'bullying' from India and China. *BBC Monitoring South Asia*, May 15 Retrieved 22 June, 2006 from web.lexis-nexis.com/universe/document?

³⁵ Halder, C. (2004,) A Himalayan Effort. *The Statesman*. August 30, 2004, Retrieved June 24, 2006, from web.lexus-nexus.com/universe

ambitions in Nepal.³⁶ In 1996 the Maoist movement took up arms and has become increasingly more powerful and influential; the King was thoroughly stripped of his powers in April 2005 following massive protests after his taking control through emergency measures in February of that year. More recently the Terai region has called for greater autonomy, further compromising a cohesive Nepalese 'attitude' towards India. After a decade of violence, Maoist leaders signed a peace accord and took their seats in Nepalese parliament on January 15, 2007.³⁷ While this should help stabilize Nepal, it may make India more wary. In his book *Nepal's Crimson Challenge*, Nishchal Nath Pandey writes that the Maoist's unequivocally demand that all unequal treaties with India, including the 1950 Treaty of Peace and Friendship and the Mahakali Treaty, ought to be abolished.³⁸

Despite these misgivings, the primary indicators suggest that Nepal and India still have relatively good relations, though they are not as well integrated as they had been in the past. Based on qualitative historical analysis, the pre-negotiation and post-treaty assessment from the constructed Table 1 were determined to be 4.8 and 4.0, respectively.

Water Relationship and Hydro-politics

With some 264 rivers flowing from Nepal to India, there is little surprise that the two countries have engaged in joint water development.

In terms of larger scale developments, activities in water management between Nepal and India started soon after the 1950 Friendship Treaty. In April 1954, the nations agreed to harness the water of the Kosi River through the construction of a dam; and five years later signed the agreement laying the foundations of the Gandak Irrigation and Power Project.³⁹ Both dams

³⁶ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia)

³⁷ Haviland, C. (2006) Nepal - Rocky path to democracy? *BBC News*, January 17, 2007 Retrieved January 17, 2007 from http://news.bbc.co.uk/2/hi/south_asia/6266575.stm

³⁸ Statesman, T. (2005) Spotlight Nepal's Crimson Challenge, *Asia Intelligence Wire*, December 19, 2005, Retrieved October 12, 2006, from web.lexus-nexus.com/universe

³⁹ *Agreement Between the Government of India and the Government of Nepal on the Kosi Project*. April 25, 1954. Accessed May 17, 2006. Retrieved May 12, 2006 from <http://ocid.nacse.org/qml/research/tfdd/toTFDDdocs/85ENG.htm>
Agreement between His Majesty's government of Nepal and the government of India on the Gandak Irrigation and Power Project, December 4, 1959, Retrieved May 12, 2006 from <http://ocid.nacse.org/qml/research/tfdd/toTFDDdocs/111ENG.htm>

were constructed in Nepalese territory with flooding occurring entirely in Nepal. They were multi-purpose structures, built for flood control, irrigation and power generation, and were brokered with the help of the UN.⁴⁰ The agreements were subsequently amended; the Gandak in 1964, and the Kosi in 1966, with an extension of the Chandra canal (West Kosi canal) agreed to in 1978. Regardless of their subsequent amendments and revisions, these agreements were viewed by many in Nepal as having been 'bad' deals. In both cases, Nepalese felt they were not adequately compensated for the adverse effects occurring due to the inundation and benefits were not equitably distributed. There was also a sense of impotence to the extent that Nepal was prohibited from using waters upstream of the Gandak dam for its own development, as it would impinge on India's irrigation uses downstream.⁴¹

Immediately following the Mahakali Treaty, both political and civil factions in Nepal demanded the Treaty be repealed as it was seen as biased towards India. Demonstrations took place in 1978 and 1979, and mild political demands were made with regard to revisions and with drawl from the Kalapni area.⁴² In 1999 the failure to develop the MRC and the lack of development of the Detailed Project Reports called into question in Nepalese parliament the validity of the Treaty.⁴³

More recently, following a provisional MOU in 2002, the Indian National Hydro Power Corporation and the Government of Nepal began making preparations for the execution of the Upper Karnali hydropower project in

Agreement Between Nepal and India on the extension of the Chandra Canal, Pumped Canal, and Distribution of the Western Kosi Canal. April 7, 1978, Retrieved May 12, 2006 from <http://ocid.nacse.org/qml/research/tfdd/toTFDDdocs/>

Amended Agreement between His Majesty's Government of Nepal and the Government of India concerning the Kosi Project. December 19, 1966. Retrieved May 12, 2006 from <http://ocid.nacse.org/qml/research/tfdd/toTFDDdocs/136ENG.htm>

⁴⁰ TFDD (2000) Transboundary Freshwater Dispute Database - Oregon State University. Retrieved between March and August, 2006 from www.transboundarywaters.orst.edu/.

⁴¹ Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March).

⁴² TFDD (2000) Transboundary Freshwater Dispute Database - Oregon State University. Retrieved between March and August, 2006 from www.transboundarywaters.orst.edu/; Dhungel, D. and Pun, S. (2005) Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals. *Ben-org*. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc

⁴³ TFDD (2000) Transboundary Freshwater Dispute Database - Oregon State University. Retrieved between March and August, 2006 from www.transboundarywaters.orst.edu/

Nepal in 2004.⁴⁴ However, while the governments were extremely close to finalizing the agreement early in 2005,⁴⁵ at the time of writing no agreement had yet been achieved. Under the agreement, the dam would generate 300 to 420 MW. Nepal is to receive and utilise 15% of the energy and sell the rest of its share – a 50/50 split – to India. However, the project, again entirely within Nepal, was deemed a sell out by many in the Nepalese influential circles, and has been postponed.⁴⁶

Regarding coordination and management, Nepal did not participate as actively as it might have in the development of the Koshi and Gandak projects. Consequently, at the first meeting of the Joint Group of Experts in 1980 Nepal made clear its intention to be a full and equal partner in the process and project.⁴⁷

Since the treaty was signed, all cooperation has been in the form of discussions and studies. No joint agency has been created to implement the Mahakali Treaty as called for; however, the states did create an India-Nepal Joint Committee on Water Resources (JCWR) in 2000 to deal with all waters shared between the states.⁴⁸ The JCWR did not meet for a further four years; but they made impressive headway when they did. One of the principal achievements was to agree upon a new site for the Pancheshwar dam at Rupaligartho.⁴⁹ The other significant achievement was the creation of several new standing committees on inundation, Embankment Construction, Power Exchange Committee, and the Joint Committee on Kosi and Gandak.⁵⁰ At the third meeting of the JCWR in October, 2005, nothing much was achieved

⁴⁴ Indian Express (2004,) New Site for Pancheshwar Power Project. *Indian Express online*, October 9, 2004, Retrieved June 23, 2006, fom web.lexis-nexis.com/universe/document

⁴⁵ Thapa, B. (2005) Nepal, India set to sign Hydropower Deal, *BBC Monitoring South Asia*, September 8,2005, Retrieved July 15, 2006, from www.lexus-nexus.com

⁴⁶ IANS (2006,) Nepal reels under power crisis as free supply goes to waste. *Indo-Asian News Service*, March 8, 2006, Retrieved August 13, 2006, from www.lexus-nexus.com/universe/document

⁴⁷ Gyawali, D. and Dixit, A. (1999) Mahakali Impasse and Indo-Nepal Water Conflict. *Economic and Political Weekly*, XXXIV (9), pp. 553-564; Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang); Dhungel, D. and Pun, S. (2005) Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals. *Ben-org*. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc

⁴⁸ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia)

⁴⁹ Indian Express (2004,) New Site for Pancheshwar Power Project. *Indian Express online*, October 9, 2004, Retrieved June 23, 2006, fom web.lexis-nexis.com/universe/document

⁵⁰ *Ibid*.

other than an agreement to speed up activities with respect to utilise water resources between the two countries.⁵¹

Despite this apparent cooperation however, functional cooperation to move ahead is lacking. Little of substance has been achieved and after ten years of operations at Tanakpur, Nepal was forced to issue a formal complaint in 2005 associated with water allocations.⁵² Nepal has not been able to enjoy fully her benefits associated with the Tanakpur barrage. The increased headways and additional water ways (Article 3(a)) have never been built;⁵³ and the original construction was such that the water outlet on the Nepalese side higher than on the Indian side, meaning there is relatively less flow for Nepal for the given water level.⁵⁴

Analysis of Process Mechanisms, a Means to Success or Failure

Figure 2 shows a marked decline in the hydro-politics in relation to the general relationship between the two neighbours. The question remains, however, as to why? Through case study analysis on international water basins, Paisley & Hearn⁵⁵ have identified several different mechanisms that promote cooperation and regime building in international waters. The principal mechanisms being balancing incentives, information exchange, stepwise cooperation, third party involvement, and engaging relevant stakeholders. Assessment of how well these have been addressed during the negotiation phase of the Mahakali Treaty (1978-1996) may shed some light as to why much of the treaty has not been implemented.

Balancing Incentives

The major benefits of the project were irrigation, flood control, and power generation. The river carries large flows, however, more than 70% of the

⁵¹ Hindustan Times (2006) India, Nepal jointly working on hydro power projects. *Asian News International*, August 11, 2006, Retrieved August 17, 2006 from web.lexus-nexus.com/documents/.

⁵² BBC M I R (2005) India and Nepal agree on water sharing, *Global News Wire*, March 19 Retrieved June 24, 2006 from web.lexus-nexus.com/documents/

⁵³ *Ibid.*

⁵⁴ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia).

⁵⁵ Paisley, R. and G. Hearn. (2006) Some Observations from Recent Experiences with the Governance of International Drainage Basins, in: A. C. Corr ea and G. Eckstien (Eds.) *Precious, Worthless or Immeasurable, the Value and Ethics of Water*. Vol 2 Symposium Proceedings of the Texas Tech Law Review, November, 2006, Lubbock, Texas.

annual flow occurs in the wet season, and the river all but dries up from January to April. Conversely, demand for irrigation water is greatest during the dry season, which prompted the building of the Sarada barrage. However, even with the Tanakpur barrage it does not run to capacity in the dry season. The new storage capacity from the Pancheshwar dam would greatly benefit the farmers of Uttar Pradesh by regulating flow in the Sarada.⁵⁶ In terms of the irrigation, India clearly sought to benefit greater from the increased availability of water to develop some 1.6 million ha of fields.⁵⁷ The fact that Nepal has not expanded her irrigation projects in the west in Dadeldhura province suggests that she would not be able to realise the full irrigation benefit of Pancheshwar in any case.

Flooding continues to plague the area, and as recently as September 2005, the river flooded, killing 15 people in Nepal's Dadeldhura and displacing over 240 families in the Kanchanpur district.⁵⁸ However, power was one of the principle reasons for the Treaty as the Indian Water and Power Commission Service (WAPCOS) recommended early on that the Pancheshwar dam be built with power production as the primary goal. Other rivers of the region that have great hydro-power potential, such as the Karnali and Supta, all flow from Nepal into India, with the best locations inside Nepal, a draw-back from India's perspective.

Nepal did not stand to benefit from the project to the same extent as India. The western part of Nepal was not as developed as other areas, and contained no large urban areas for power consumption or big agricultural projects. Though, by the early 1980's she had turned her attention to developing hydropower as a means of foreign currency earnings.⁵⁹ Beyond water related

⁵⁶ Thapa, B. (2005) Nepal, India set to sign Hydropower Deal, BBC Monitoring South Asia, September 8, 2005, Retrieved July 15, 2006, from www.lexus-nexus.com

⁵⁷ Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March).

⁵⁸ ReliefWeb (2005) OCHA Situation Report No 1 Nepal Floods, Issued 30 September, 2005, Office for the Coordination of Humanitarian Affairs, Retrieved October 10, 2006, from http://www.reliefweb.int/rw/fullMaps_Sa.nsf/

⁵⁹ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia); Rahaman, M. M. (2005) *Integrated Water Resources Management in the Ganges Basin, Constraints and Opportunities*, Licentiate of Technology, Department of Civil and Environmental Engineering, Helsinki University of Technology. Espoo. 90 pages. Retrieved September 12, 2006, <http://www.water.tkk.fi/wr/tutkimus/thesis/Rahaman2005.pdf>

interests, were key desires to be taken as a serious and equal partner;⁶⁰ and rectify the embarrassment caused by the Tanakpur barrage.⁶¹ It is the author's opinion that Pancheshwar likely became intertwined to make the deal sweeter and more 'sellable' for both sides, for both national and international audiences.

Between 1976 and 1996, effort was placed in meeting Nepal's needs in terms of 'equity' over the Tanakpur Barrage and the potential Pancheshwar Dam. The amount of power that Nepal was to receive from Tanakpur doubled from what was agreed to in 1991 to the final agreement in 1996. Regarding the Pancheshwar, control of resources was dealt with by agreeing to construct similar power generation facilities on both sides of the river (Article 2); this was despite India's initial observation that it was not feasible.⁶² Furthermore, that there would be a 50/50 split of power addressed Nepal's principle need to be dealt with as an equal, and the setting up of a joint commission to maximise benefits addressed the need for ensuring the best possible payback from the project. It should be noted that India entered into the agreement assuming a cheap power source, while Nepal entered assuming a potential for large foreign exchange earnings. The details of energy pricing were not clearly dealt with, and continue to be a problem.

Information Exchange

Initially at least, information exchange was not a prolific endeavour. Nepal had not the resources nor was eager to conduct studies. India on the other hand had completed several feasibility studies, one of the most conclusive being the WAPCOS report in 1971.⁶³ India was prepared to share some information with Nepal, for the purpose of 'getting things going'. However, through the late 1970's and 1980's, India complained that Nepal was too slow in carrying out agreed actions, such as nominating engineers and begin studies.⁶⁴

⁶⁰ Gyawali, D. and Dixit, A. (1999) Mahakali Impasse and Indo-Nepal Water Conflict. *Economic and Political Weekly*, XXXIV (9), pp. 553-564.

⁶¹ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia)

⁶² Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang)

⁶³ *Ibid.*

⁶⁴ *Ibid.*

Nepal, for her part, had reason for concern that India was not going to be forth coming with vital information concerning the water resources, the power generated or the value to irrigation. India's recent interaction with Bangladesh over the Farakka Barrage, in which she was accused of diverting waters from Bangladesh in the dry seasons of 75 and 76, prompted intervention from the UN General Assembly.⁶⁵ Because of India's previous experience in developing barrages for power and irrigation, and the fact that they had conducted a pre-feasibility study of the site, meant they possessed a great deal of data and information, not only regarding the hydrology of the river, but also the socio-economic data.⁶⁶ She further possessed information regarding the agricultural sector in Uttar Pradesh and how and for what the new irrigation water would be used. This information was not only important calculating the substantive quantities of power and water available, but also the 'value' of those quantities for equitable sharing of benefits. India was reluctant to share her information, and Nepal reluctant to sell its natural resources for too little.

As early as September 1984, Nepal asked India to share the data she had obtained to that point. For years, Nepalese officials requested information so that they would be better able to evaluate the proposal, and while some data was provided regarding the parameters, methodologies and scales of their studies by 1988, these were insufficient for Nepal to carry out comparable studies on the Nepalese side of the river.⁶⁷

Nepal was well aware of India's capabilities in the field of water resources management, as well as her own lack of them.⁶⁸ To ensure a more level playing field, in 1981, she suggested that foreign experts be involved to help conduct surveys and assess information. India initially refused, offering that all work done should be conducted by India at her own expense. This further developed a power imbalance between the two. Eventually, in 1988, it was

⁶⁵ Paisley, R. and G. Hearn. (2006) Some Observations from Recent Experiences with the Governance of International Drainage Basins, in: A. C. Corr a and G. Eckstien (Eds.) *Precious, Worthless or Immeasurable, the Value and Ethics of Water*. Vol 2 Symposium Proceedings of the Texas Tech Law Review, November, 2006, Lubbock, Texas.

⁶⁶ Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang)

⁶⁷ *Ibid.*

⁶⁸ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia).

agreed that each side would undertake investigations separately in its own territory. India conducted and paid for its investigations, while Nepal sought and received international assistance.⁶⁹

Stepwise Cooperation

A cursory look at the events leading up to the Mahakali Treaty might lead to the assumption that cooperation evolved through a stepwise process. Exchange of interest in developing the basin came from India as early as 1978. The creation of the Joint Group of Experts in 1980 allowed for a forum of senior practical level discussions. The commencement of a smaller project, the Tanakpur Barrage, in 1983, and its completion in 1989, was followed by two co-sharing agreements based on using some of Nepal's territory for upgrading the barrage. A more holistic Mahakali River Treaty involving benefit sharing from three infrastructure projects then followed.

Examining aspects of hydro-politics in greater detail shows that little effort was taken to conduct cooperation in a stepwise form. The initial interest in the Pancheshwar dam was purely from India. Information exchange was generally poor until the final preparation of documents in 1995. Initially, India had no intention to make the Tanakpur barrage anything other than an Indian affair, and only included Nepal when it had to.

From start to finish, the Mahakali Treaty was kept at high levels and generally behind closed doors, though the Nepalese government did invite representatives from various ministries and provinces to attend meetings.⁷⁰ Both Indian and Nepalese policy makers rejected offers from academics to foster greater communication and understanding by conducting informal meetings and promoting independent collaboration between academics and professionals across the Indian-Nepalese border.⁷¹ As a means of lessening risk and encouraging confidence building, academics forwarded an idea of developing smaller medium-scale run-of-the-river hydroelectric plants that could be floated as joint ventures between Nepal and the Indian business

⁶⁹ *Ibid.*; Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang)

⁷⁰ Gyawali, D. (1999) Institutional forces behind water conflicts in the Ganga plains. *GeoJournal*, 47 (3, March), pp. 443-452.

⁷¹ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia).

community of Uttar Pradesh and Bihar. Initially interested, the Indian ambassador refused to mention it further and within two years India and Nepal had agreed to the Pancheshwar mega dam project.⁷² In short, there was little to no attempt to conduct a stepwise approach to cooperation in the development of the Mahakali Treaty.

Third Party Involvement

Third party involvement in the Pancheshwar dam project was critical for Nepal on two major accounts. The first was developing the capacity to create project assessments and negotiate with India as an equal in terms of knowledge of the substantial aspects of the project. These included calculation of the potential value of benefits accruing. The second, as a watchdog to ensure equitable sharing. India, however, was not receptive to the request that international engineers be involved in discussions, let alone bring in foreign experts to help with the information gathering.⁷³

Nevertheless, the involvement of third parties, particularly in terms of technical assistance to Nepal was important in facilitating the development of an agreement. Prior to the first meeting of the Joint Group of Engineers, the Nepalese government had Canadian advisors assisting in developing the water resources of the country⁷⁴; and through the International Development Agency (IDA), Nepal obtained financial assistance to carry out her investigations of the project in 1989 which were concluded in 1992.⁷⁵

Engage Relevant Stakeholders

The concept of 'relevant stakeholders' is not clear in the case of India and Nepal, and indeed is extremely difficult to assess. While the Treaty does ensure that up to 5% of the water may be diverted for local community use (Article 7), there is no indication that there was much of any consultation

⁷² *Ibid.*

⁷³ Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang).

⁷⁴ *Ibid.*

⁷⁵ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia); Gyawali, D. and Dixit, A. (1999) Mahakali Impasse and Indo-Nepal Water Conflict. *Economic and Political Weekly*, XXXIV (9), pp. 553-564.

with local communities, except possibly in terms of irrigation needs.⁷⁶ There is no evidence that either government discussed with those stakeholders who were to be moved or relocated because of the Pancheshwar dam.⁷⁷ Indeed Gyawali indicates that in 1988 the major water development agencies in the region (India, Nepal and Bangladesh) considered infrastructure development so paramount to advancement that attempting to place social and environmental concerns on the agenda was considered as 'negativism.'⁷⁸

Lack of local stakeholders in dam development was consistent with other projects in the region. The Nepalese government did not give the promised compensation to a pitifully small number of seven families who were relocated due to the building of the Marsyanghi project in 1989.⁷⁹ Also, India has never given the agreed compensation to the 77 families dislocated due to the erosion of 86 ha of farmland associated with the Tanakpur project. However, this is hardly surprising as India has one of the worst forced relocation record in the world.⁸⁰

At the international level, there is no indication that the interests of Bangladesh were ever considered, even though as part of the Ganges system the Mahakali River flows into Bangladesh contributing an estimated 6% of the annual Ganges flow. With the Pancheshwar dam set to have a live storage capacity of 6.56 BCM it has the potential to influence dry season flows of the Ganges.⁸¹

Conclusion

As the saying goes, 'the Devil is in the details.' Several important incentives were met through the Mahakali Treaty, for India cheap power supply, flood control and irrigation, and for Nepal foreign currency, irrigation, flood

⁷⁶ Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang).

⁷⁷ Gyawali, D. (1996) *High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists*. *Himal South Asia*, 9 (March).

⁷⁸ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia).

⁷⁹ Gyawali, D. (1996) *High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists*. *Himal South Asia*, 9 (March).

⁸⁰ *Ibid.*

⁸¹ Dhungel, D. and Pun, S. (2005) *Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals*. *Ben-org*. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc

control and being taken as an equal partner. However, the lack of information exchange surrounding benefits undermined the incentives. Equity could not be established with regard to benefit sharing provided, as the irrigation benefits to India were never adequately assessed, nor was an agreed price for energy established. Perhaps most importantly, the lack of information sharing did not work to promote trust between the nations, but rather inspire the opposite. In more recent years, new efforts have emerged, particularly amongst the academic communities, and the setting up commissions under the aegis of the JCWR is encouraging. It is interesting to note that a more stepwise form of cooperation is being undertaken with both the development of smaller research and topic groups as well as through promotion of academic and informal institutional linkages.⁸² Fully integrated coordination, such as joint surveys, may not be essential for cooperation; however, the lack of coordination in management and operational development exhibited in the period leading up to the Mahakali Treaty hindered its implementation after. While India was not forthcoming with information, Nepal dragged her feet with respect to conducting surveys and forwarding plans.

The UN helped broker both the Kosi and Gandak agreements; however, no third party played a significant role in the negotiation of the Mahakali Treaty. Nepal did, however, receive support in the form of surveys, building technical capacity and possibly advice on substantive issues. Her interest in the use of third parties, it can be assumed, is to increase equity in the agreement, to increase trust between parties, to minimise her financial costs and to increase her technical capacity. Only the latter two were really satisfied. Foreign consultants may have assisted in assessing the equity of the agreement, however, their unilateral involvement did nothing to increase trust.

While local stakeholders may not have been given much consideration in the development of the Mahakali Treaty, it is encouraging to note that a new site was chosen for the Pancheshwar dam in 2005 in consideration of local

⁸² Sen, A. (2004) Finding Common Ground Between India and Nepal, Mahakali Treaty and Pancheshwar Project, *Net-edition The Financial Express*, May 1, 2004. Retrieved August 10, 2006, from www.financialexpress.com/fe_full_story.php?content_id=58182

interests. Indeed, local voices are taking a greater part in development in the region. Local controversy and environmental concerns have stalled the large Tehir dam for several years. While they have not been able to cancel many dams, activists have been able to slow their development and ensure some care is given to local social and environmental concerns. Regarding other basin states, at the end of the day India may be forced to approach the Ganges-Brahmaputra system jointly with Nepal, Bhutan and Bangladesh to solve water issues of flooding, irrigation and power generation in the region. While, as the regional power, they may prefer to engage with other nations on a 'one-on-one' basis, this may become increasingly difficult in the face of greater regionalism, and the increasing development of their neighbours.

Even though it continues to be discussed, the future is uncertain for the Pancheshwar dam. For one thing, incentives change and so do the players. When the Treaty was signed, Uttar Pradesh was the Indian state where the main benefits were to occur. Uttaranchal, a new state formed from northern Uttar Pradesh in 2000, is where the majority of the flooding and dislocation will occur, while all the irrigation benefits will be in Uttar Pradesh.⁸³ Also, the Indian Tehir dam is set to supply over 1.1 million hectares, and augment a further 700,000 ha of irrigation land in Uttar Pradesh as well as generate power for northern India.⁸⁴ Finally, Nepal will likely prioritise other more beneficial sites entirely under her control.

⁸³ Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia).

⁸⁴ Sunil, J. (2002). Where's Roy Now? Big dams would have helped this drought in *Financial Express* August 22, 2002. Retrieved June 22, 2006 from www.financialexpress.com

References

- AFP (2005). Nepal arms deals worry India, Agence France Presse - English, December 20 Retrieved August 12, 2006 from www.lexus-nexus.com
- BBC M I R (2005) India and Nepal agree on water sharing, Global News Wire, March 19 Retrieved June 24, 2006 from web.lexus-nexus.com/documents/
- BBC Worldwide, M. (2005) Nepalese paper calls for response to 'bullying' from India and China. BBC Monitoring South Asia, May 15 Retrieved 22 June, 2006 from web.lexis-nexis.com/universe/document?
- Beierle, T. and J. Cayford (2002) *Democracy in Practice, Public Participation in Environmental Decisions* (Washington D.C., RFF Press Book).
- Bernauer, T. (2002) Explaining success and failure in international river management *Aquatic Sciences*, 64, pp. 1-19.
- Brown, L. (2003) The effects of emerging water shortages on food in: A. M. and R. Jehl (Eds) *Who's water is it?* (Washington, National Geographic).
- Dhungel, D. and Pun, S. (2005) Impact of the Indian River-linking Project on Nepal, A Perspective of Nepalese Professionals. Ben-org. Retrieved October 12, 2006 from http://www.ben-center.org/ConfPapers_2005/Dhungel.doc
- Druth, R. (1998) Transboundary Externalities and Regional Integration in W. Sheumann and M. Schiffler (Eds.) *Water in the Middle East, Potential for Conflicts and Prospects for Cooperation.* (57-69) (Amsterdam, Springer).
- Financial Express (2006,) Powerless India eyes energy booster from Neighbours. Global News Wire, August 17 Retrieved September 12, 2007 from <http://web.lexus-nexus.com/documents/>.
- FNCCI (2006) Trade with India, Federation of Nepalese Chambers of Commerce and Industry, Retrieved January 10, 2007 from <http://www.fncci.org/indicator.php>
- Giordano, M. A. and A. T. Wolf (2003) Sharing waters, Post-Rio international water management, *Natural Resources Forum*, 27, pp. 163-171.

- Gyawali, D. (1996) High Dams for Asia, Neo-Gandhian Maoists vs Nehruvian Stalinists. *Himal South Asia*, 9 (March)
- Gyawali, D. (1999) Institutional forces behind water conflicts in the Ganga plains. *GeoJournal*, 47 (3, March), pp. 443-452.
- Gyawali, D. (2001) *Water in Nepal*, (Kathmandu, Himal Books and Panos South Asia)
- Gyawali, D. and Dixit, A. (1999) Mahakali Impasse and Indo-Nepal Water Conflict. *Economic and Political Weekly*, XXXIV (9), pp. 553-564.
- Haldar, C. (2004,) A Himalayan Effort. *The Statesman*. August 30, 2004, Retrieved June 24, 2006, from web.lexus-nexus.com/universe
- Haviland, C. (2006) Nepal - Rocky path to democracy? *BBC News*, January 17, 2007 Retrieved January 17, 2007 from http://news.bbc.co.uk/2/hi/south_asia/6266575.stm
- Hindustan Times (2005) Maoist infiltration attempt failed, *Hindustan Times*, June 9, 2005 Retrieved June 4, 2006, from web.lexus-nexus.com/documents/.
- Hindustan Times (2006) India, Nepal jointly working on hydro power projects. *Asian News International*, August 11, 2006, Retrieved August 17, 2006 from web.lexus-nexus.com/documents/.
- IANS (2006,) Nepal reels under power crisis as free supply goes to waste. *Indo-Asian News Service*, March 8, 2006, Retrieved August 13, 2006, from www.lexus-nexus.com/universe/document
- Indian Express (2004,) New Site for Pancheshwar Power Project. *Indian Express online*, October 9, 2004, Retrieved June 23, 2006, from web.lexis-nexis.com/universe/document
- Marty, F. (2001) *International River Management, Problems Politics and Institutions*. (Bern, Peter Lang)
- Paisley, R. and G. Hearn. (2006) Some Observations from Recent Experiences with the Governance of International Drainage Basins, in: A. C. Corr ea and G. Eckstien (Eds.) *Precious, Worthless or Immeasurable, the Value and Ethics of Water*. Vol 2 Symposium Proceedings of the Texas Tech Law Review, November, 2006, Lubbock, Texas

- Radio Nepal (2005,) Nepal, India discuss water sharing at Tanakpur barrage. BBC Monitoring South Asia, March 17, 2005, Retrieved August 12, 2006, from web.lexus-nexus.com/documents/.
- Rahaman, M. M. (2005) Integrated Water Resources Management in the Ganges Basin, Constraints and Opportunities, Licentiate of Technology, Department of Civil and Environmental Engineering, Helsinki University of Technology. Espoo. 90 pages. Retrieved September 12, 2006, <http://www.water.tkk.fi/wr/tutkimus/thesis/Rahaman2005.pdf>
- ReliefWeb (2005) OCHA Situation Report No 1 Nepal Floods, Issued 30 September, 2005, Office for the Coordination of Humanitarian Affairs, Retrieved October 10, 2006, from http://www.reliefweb.int/rw/fullMaps_Sa.nsf/
- Sarkar, S. (1993) India-Nepal relations, 1960-1991. (Calcutta, India, Minerva Associates)
- Sadoff, C. and D. Grey (2002) Beyond the river, the benefits of cooperation on international rivers *Water Policy* 4, (5), pp. 389-403.
- Sen, A. (2004) Finding Common Ground Between India and Nepal, Mahakali Treaty and Pancheshwar Project, Net-edition *The Financial Express*, May 1, 2004. Retrieved August 10, 2006, from www.financialexpress.com/fe_full_story.php?content_id=58182
- Statesman, T. (2005) Spotlight Nepal's Crimson Challenge, *Asia Intelligence Wire*, December 19, 2005, Retrieved October 12, 2006, from web.lexus-nexus.com/universe
- Sunil, J. (2002). Where's Roy Now? Big dams would have helped this drought in *Financial Express* August 22, 2002. Retrieved June 22, 2006 from www.financialexpress.com
- TFDD (2000) Transboundary Freshwater Dispute Database - Oregon State University. Retrieved between March and August, 2006 from www.transboundarywaters.orst.edu/.
- Thapa, B. (2005) Nepal, India set to sign Hydropower Deal, BBC Monitoring South Asia, September 8, 2005, Retrieved July 15, 2006, from www.lexus-nexus.com

- Upreti, B. C. (1993) *Politics of Himalayan river waters, an analysis of the river water issues in Nepal, India and Bangladesh.* (Jaipur, India. Nirala Publications).
- von Winterfeldt, D. (1992) *Expert Knowledge and Public Values in Risk Management, The Role of Decision Analysis,* in: S. Krimsky and D. Golding (Eds.) *Social Theories of Risk,* (pp 321-342) (Wesport, Praeger)
- Yoffe, S., Wolf, A. and Giordano, M. (2003). *Conflict and Cooperation Over International Freshwater Resources: Indicators of Basins at Risk,* *Journal of American Water Resources Association,* October pp. 1109-1126.

Appendix

Figure 1, Location Map of Mahakali Treaty Area

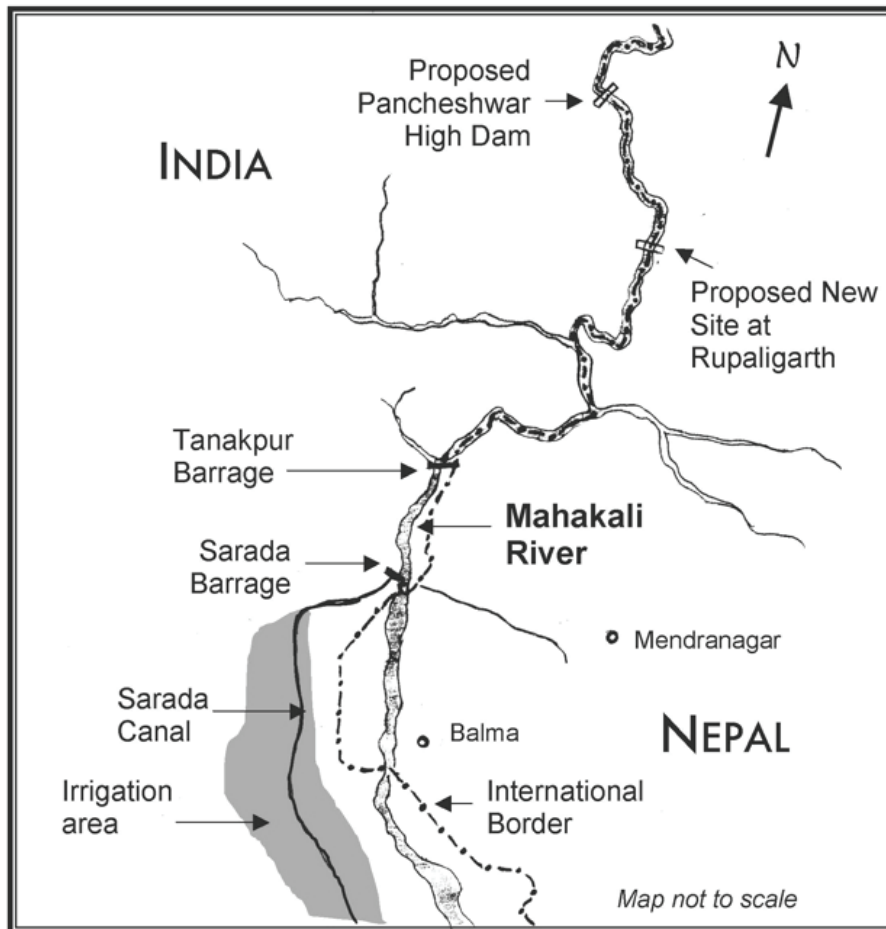


Figure 2, Water related events and relationship between India and Nepal

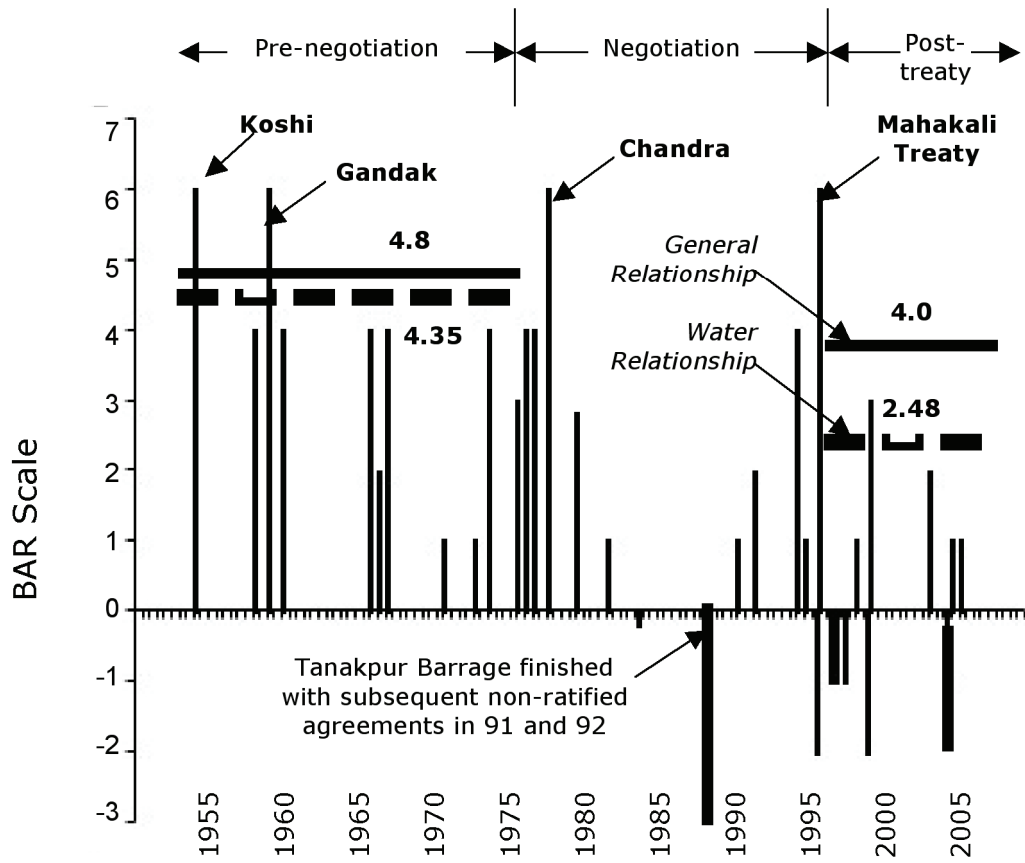


Table I, *Constructed Scale for Integration and Relationship*

Integration and Relationship	
Scale	General Indicators
	Integration
1	States in the basin are not integrated, there is little important trade between them, there is high tension and poor relationships, including small scale military acts, to larger acts of aggression with casualties. COPDAB Relationship scale (15 to 13)
2	States in the basin are partially integrated, there is some trade between them but they are not significant trading partners, trading is limited to only a few commodities, tensions exist economically and over sovereignty issues, displays off political or military hostility, economic hostile action. COPDAB Relationship scale (12 to 10)
3	States in the basin are moderately integrated, there is trade but do not fall in the top 5 trading partners, trading is over several different sectors, tensions over economic or sovereignty issues exist, including mild verbal expressions displaying discord in interaction, no acts of aggression between basin states. COPDAB Relationship scale (9 to 7)
4	Good relationships within the basin, countries are economically integrated (some countries in the basin fall within top 5 trading partners of others), some tensions over economic or sovereignty issues may exist, no acts of aggression between basin states. COPDAB Relationship scale (6 to 4)
5	Maximum integration and good relations between basin states. Trade between them is important for most states (countries have at least one other basin state in their top 5 trading partners), relations in many sectors, few tensions over economic or sovereignty issues, no acts of aggression between basin states. COPDAB Relationship scale (3-1)

Note the COPDAB (Conflict and Peace Data Base) Scale was developed by Edward Azar in 1980 and adapted by Yoffe et al. (2003) for use in the Basin at Risk studies.

Participating Authors

Mr. Glen Hearn is a PhD. Candidate at the Institute for Resources Environment and Sustainability, University of British Columbia, Canada.

Dr. Ashok Regmi is a Research Associate at the Workshop in Political Theory and Policy Analysis, Indiana University, Indiana, USA.

Dr. Ganesh Shivakoti is a Professor of Agricultural and Natural Resources Economics School of Environment, Resources and Development, Asian Institute of Technology, Bangkok, Thailand.

Dr. Bishnu Raj Upreti is the Regional Coordinator of the Swiss National Centre of Competence in Research (NCCR) North-South, Kathmandu, Nepal.