

Project Report

Development of Effective Water-Management Institutions

A Regional Study Implemented by the
International Water Management Institute

With Financial Support from the Asian Development Bank (RETA 5812)

Final Report, Volume I
Executive Summary

30th June 2003

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Foreword

The ADB-supported study on “Development of Effective Water-Management Institutions” conducted by IWMI was started in 1999 as a 3-year regional activity. It focused on selected river basins in five Asian countries: People’s Republic of China, Indonesia, Nepal, Philippines and Sri Lanka. Later, the study period was extended to 31 December 2002, to allow more time for country teams to formulate preliminary action plans. The originally designed work plan included in-depth institutional and performance assessments in the selected river basins in the five developing countries, and selected advanced river-basin case studies in at least two developed countries. This work plan was also extended to cover national-level policy analyses initiated during 2002. Consequently, the preparation of the final report of this study was postponed until the end of June 2003, in order to consider all the country-based reports including water-sector policy analyses in the five countries.

The final reporting material of the overall study comprises four components, which are structured in terms of the four main study outputs expected in the IWMI-ADB Technical Assistance Agreement. The executive summary and the four output components are presented in five volumes of the Final Report:

Volume	I	–	Executive Summary.
Volume	II	–	Conceptual Framework.
Volume	III	–	Case Studies of Advanced River Basins.
Volume	IV	–	Country Studies and Action Plans.
Volume	V	–	Towards Water Sector Reforms.

Volume I of the Final Report gives an outline of the study background and its rationale, and provides a summary of the contents of the other four volumes of the final report.

Volume II of the Final Report deals with the conceptual basis for the study, objectives and methodologies of the study, as well as a comment on essential management functions based on study outcomes.

Volume III presents the reports obtained on three advanced river-basin case studies selected from Australia, Japan and Indonesia. It also gives a comment on the replicability of some of the key features of these river basins, which have been developed to an advanced stage, and which are managed according to advanced procedures.

Volume IV contains the reports of the country studies and action plans prepared by the country study teams.

Volume V presents a summary of study efforts in promoting national reform measures in the water sector of the participating countries, and the five policy-analysis country reports prepared by selected experts. The titles of these country reports and the names of their authors are:

- “China’s Efforts in Introducing Water Policy and Initiating Related Institutional Development for IWRM,” by George E. Radosevich.
- “Indonesia’s Water-Sector Policy and Institutional Reform Process,” by Theodore Herman

- “Implementation of Integrated Water-Resources Management in the Philippines,” by Willie Barreiro.
- “Sri Lanka’s Efforts in Introducing Water-Sector Policies and Initiating Related Institutional Development,” by V. K. Nanayakkara.
- “Thailand’s Efforts in Introducing Water Policy and Initiating Related Institutional Development for Integrated Water-Resources Management (IWRM),” by Lien, Nguyen Duc.

We take this opportunity to thank the ADB and its staff involved in monitoring this study effort through its RETA 5812 mechanism. They provided excellent support to IWMI to make this effort a success. The individuals and groups that helped us to conduct basin studies, stakeholder consultations and policy analyses are many. The cooperation from all of them and their valuable efforts in conducting institutional and technical research with the help of relevant operating agencies are gratefully appreciated.

D. J. Bandaragoda

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Project Leader for the Study*

Executive Summary of Final Report

Abstract

IWMI's regional study, "Development of Effective Water Management Institutions," initiated in 1999, had the overall goal of improving the management of scarce water supplies available for agriculture within, and responsive to, a framework for integrated water resources management (IWRM) in a river basin context. Its specific objective was to identify institutional strategies, and develop and initiate the implementation of policies and institutional strategies aimed at realizing the overall goal.

The study confirmed the existence of a strong technical-institutional linkage in water resources management, and the need to invest sufficient time and resources in improving the institutional framework for IWRM. The core activity of the study was a set of in-depth institutional and performance assessments on selected river basins in five of ADB's developing member countries (People's Republic of China, Indonesia, Nepal, the Philippines and Sri Lanka). A rapid appraisal of two river basins in Thailand was added to the study later. In addition, case studies have been conducted in river basins, with an advanced stage of water resources development and management. In Murray-Darling, Australia and Omonogawa, Japan the objective was to identify key elements of successful water resources management that may serve as useful lessons for transfer to developing countries. In Brantas, Indonesia, the objective was to assess how an effective institutional framework and a single basin organization have been developed and installed to cover multiple uses of water in a large river basin in a developing country.

In order to examine the issues emerging from IWMI's six-country study and from a similar two-country study undertaken by the International Food Policy Research Institute (IFPRI), IWMI and IFPRI jointly organized a regional workshop in Malang, Indonesia in January 2001, with the sponsorship of the Asian Development Bank (ADB). The former focused on institutional aspects and the latter on technical linkages with IWRM, in a river basin context. The Proceedings of this workshop have been published by IWMI. Towards the end of IWMI's study, a 3-day collaborative event took place in Bangkok Thailand, May 2002, combining a Regional Seminar on Governance for Integrated Water Resources Management in a River Basin Context and a Ministerial Roundtable Dialogue on Water Sector Challenges, and Strategies for Policies and Institutional Development. The Ministerial Roundtable Dialogue involved delegations of Ministers and Senior Officials from the ten countries: Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, the Philippines, Sri Lanka, Thailand and Vietnam. The joint events were highly collaborative, as IWMI received support from the Royal Thai Government, the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), the ADB, Kasetsart University of Thailand (KU) and IFPRI. The ministerial discussions were based on the results of research findings. The culmination was the issuance of a Joint Statement by the Ministerial Delegations on water resources management, outlining Asia's future water challenges, agreeing on a set of shared principles and deciding on priorities for action. The Joint Statement stressed the need for extensive exchange of information despite national diversity in order to secure water rights for everyone. Sharing technologies, expertise, research, training, capacity building and best practices is a cost-effective and efficient

approach to meet the severe water challenges. In general, IWMI's multi-country study on effective water management institutions, supported by ADB's RETA 5812, has been able to mobilize considerable interest among policy-level persons in each country. The study teams, within their limited resources, have influenced some key stakeholders in the river basins they studied, as well as academics and policymakers at the national level, to move forward in their reform programs.

Chapter 1

Introduction

The famous motto of the 1999 World Water Day, “everybody lives downstream” signifies the value of considering “off-site” effects and upstream-downstream relationships in water resources systems. It highlights the need to think beyond the traditional focus on isolated sites of water use entities, such as irrigation systems, hydropower plants, or water purification plants. In a new paradigm shift related to integrated water resources management (IWRM) in the context of a river basin, attention is now being drawn to consider the upstream “off-site” influences on water use entities, as well as the downstream “off-site” impacts arising from them. Following the path of water flow in a river basin we find numerous water-related human interventions, including water storage, diversion, regulation, distribution, application, pollution, purification and other associated acts to modify the natural system. All of these have one common effect, to impact on those who live downstream of each point of human intervention in the water flow. This rather simple disclosure drives home the concept that a river-basin analysis of water would enhance the common understanding of the issues on overall productivity of water and related strategies. It also tends to highlight the importance of equity and sustainability issues related to IWRM.

Global Situation

Water used for agriculture accounts for the highest proportion of all water available for human use. Globally, agriculture accounts for 66 percent of freshwater withdrawals and 85 percent of freshwater consumption (Shiklomanov 2000). The dominance of agriculture in water use makes it vulnerable in view of growing competition for water by other uses, which have recently shown a rapid growth in water consumption. Water withdrawals for industrial and domestic uses have increased four times between 1950 and 1995, whereas agricultural water use has only doubled during that period (Cosgrove and Rijsberman 2000).

Increased knowledge on the limitations, finiteness and vulnerability of water as a resource surfaced an accentuated new concern on water. The famous Agenda 21 of the Earth Summit in Rio de Janeiro (Savenije and van der Zaag 1998), and the Dublin Conference on Water and the Environment (ICWE 1992) converged on a set of principles, leading to the notion of “integrated water-resources management” (IWRM). According to Dublin Principles, the term IWRM implied an “inter-sectoral approach, including representation of all stakeholders, all physical aspects of water resources, and sustainability and environmental considerations.”

A similarly comprehensive coverage in water resources management was meant by “integrated water resources systems” (Keller et al. 1996), a concept that came to be known as the “IWMI paradigm.” The main feature of this concept is that it explicitly includes water reuse in a basin, in which the water that is diverted but not fully utilized by any water use sector upstream of the river could be captured by any water use sector downstream. However, overall, water scarcity is becoming a serious threat to the future food security and well-being of the people in developing countries.

Until recently, most developing countries have been investing heavily in water development as a major economic engine of growth. But the very success of these investments coupled with

productivity improvements has reduced food-grain prices while consuming large amounts of water now needed in other sectors. In this scenario, many developing countries needed to reexamine their policies, institutions and strategies for the water sector, with considerable support and encouragement from international agencies. At the global level, the Global Water Partnership and World Water Council have been established to promote a more integrated approach to water resources management.

Asian Situation

In May 1996, the Asian Development Bank (ADB) started a regional consultation to help define its new water policy (ADB 1996). These efforts led to a broad recognition among member countries of the need for IWRM and confirmed that institutional issues were critical in promoting effective water sector development. The Asian countries are increasingly seeing the reality of inter-sectoral water transfers from irrigated agriculture to other uses. Concurrently, rapid population increases require an increased amount of food to be produced per unit of water consumed. In addition, as widespread deforestation affected the hydrological balance, increasing industrial and agricultural pollution resulted in deteriorating the quality of water.

The population of the Asian and Pacific regions is about 3.0 billion, which is 55 percent of the world's population, and it is expected to grow to over 4.2 billion by 2025. In many countries, rising populations, combined with rapid economic growth and higher levels of urbanization and industrialization, are seriously affecting natural resources, including air, land, forests as well as water. Asia's per capita water availability has dropped by 70 percent since 1950 (ADB 2001). Scarcity of water, compounded by growing levels of water pollution, is becoming an increasingly serious constraint to economic growth, food security, and human health and well-being. At present, only about 60 percent of the urban population and 40 percent of the rural population of Asia have access to safe drinking water, and fewer have adequate sanitation.

The remarkable growth in Asian food production over the past three decades can largely be attributed to the growth in irrigated agriculture. Between 1965 and 1984, the net irrigated area grew at a compound rate of 1.6 percent while food production was increasing at about 3 percent per year. At present, about 40 percent of the cropland in Asia is irrigated and this area accounts for about 70 percent of the total cereal production. During the past decade, however, this rate of expansion in irrigated area has declined and is nearly stagnant throughout Asia. Perhaps more alarming from a food-security perspective, there has been very slow growth in yields and total output of rice and wheat during the past decade in most Asian countries. The increasing scarcity of water means that in many river basins, not only is there no possibility of further increases in area but irrigation water is being diverted to other uses, especially during the dry season. It is unlikely that future additional demand for food can be met by expanding irrigated area or intensity as was done in the past. In a growing number of countries, water has become the single most important constraint to increasing food production.

These trends signal an impending food-security problem compounded by a water resources crisis, unless significant measures are taken by Asian nations and international development agencies to develop a capacity to produce more food with less water. Irrigated agriculture must become more productive per unit of land and water. Currently, the performance of many irrigation systems is suboptimal, especially in medium to large-scale publicly managed irrigation systems. It has been widely documented that deteriorating irrigation infrastructure and poor performance

of canal-irrigation systems have caused major financial and water use inefficiencies, loss of agricultural and economic productivity and unsustainable conditions for operations (World Bank 1994).

Numerous reasons can be adduced for this suboptimal performance of publicly managed irrigation schemes. These include a) inadequate financial resources, involving both insufficient funds for adequate operations and maintenance (O&M) and poor management of available funds, b) lack of good governance, c) bureaucratic disincentives for improving performance, and being more responsive to the needs of farmers, and d) low salaries of staff. The basic point, supported by research as well as the experience of practitioners, is that institutional and organizational factors, more than purely technical weaknesses, are the primary causes of poor performance.

In many Asian countries, attention is now being focused on major reforms in policies, institutions and development strategies necessary to manage growing water scarcity effectively. New approaches to the analysis and management of irrigated agricultural systems are sought within the framework of IWRM. Current needs are being identified. From a technical perspective, a river basin approach to look at both surface water and groundwater resources is necessary in order to capture aspects of recycling and to be able to distinguish between water that is diverted and water that is consumed (Keller et al. 1996). From an institutional perspective, the new challenges of increasing competition for scarce resources, increasing demand and deteriorating water quality require a more responsive institutional structure than has been the case in the past. Given that, generally, irrigation has lower priority than urban or rural water supplies, major changes in policy, strategy and implementation are required. Irrigation agencies are now beginning to face these challenges.

During the past two decades, considerable attention has been given to addressing the problems at the secondary and tertiary levels of the irrigation system. Many countries in Asia have tried to promote participatory management through transferring at least some management responsibility to water user associations (WUAs) (Johnson et al. 1995; Vermillion 1996, 1997). While these efforts have had some success, achieving the full potential benefits of irrigation management transfer has been hampered by institutional and policy constraints at system, river-basin, provincial and national levels. Although greater financial autonomy and accountability are being introduced, there has been little evidence of more efficient use of water resources so far. In Asia, very little action has been taken to address problems at the higher levels of system and agency management. However, policymakers are beginning to recognize the necessity of an integrated approach to solving water resources problems, leading to a renewed focus on higher-level institutional issues.

It is no longer possible to successfully improve irrigation management in isolation from the management of water for other purposes. A holistic approach with a broad set of water sector policies and institutions, and service management agencies, is essential for successful management of scarce water resources. Improving the institutional framework further is now recognized as a necessary condition for successful water management in the current context. Considering these imperatives and the fact that agriculture uses over 80 percent of the available water, the proponents of this study rightly fixed its focus on the implications of nonagricultural water uses on agricultural water uses, viewed in the context of IWRM in river basins.

Chapter 2

Study Background

The study originated from a proposal by the International Water Management Institute (IWMI) to the Asian Development Bank (ADB) in December 1997. Based on the proposal, the Bank authorized the technical assistance agreement titled, “RETA 5812 - Agriculture and Natural Resources Research at CGIAR Centers: Development of Effective Water Management Institutions,” in January 1999. Inception activities started immediately.

IWMI, in consultation with the Bank and country partners, selected five river basin study sites: Fuyang river basin in northern PRC; Omblin subbasin of the Inderagiri river basin in West Sumatra, Indonesia; East Rapti river basin in Nepal; Upper Pampanga river basin in the Philippines, and Deduru Oya river basin in Sri Lanka.

In July 2001, IWMI staff started collaborating with a team of researchers from the Kasetsart University (KU) to join this multi-country study. In August 2001, the combined team undertook a rapid appraisal of two river basins: Mae Klong and Bangkapon, following the framework and the methodical guidelines of the overall study. The KU participation was supported by the Thai Research Fund, and IWMI staff time by IWMI’s core funds.

Study Objectives

The overall purpose of the study was to improve the management of scarce water supplies for agriculture in the participating developing member countries (DMCs), within and responsive to a framework for IWRM.

The specific objectives were to assess the existing physical, social and institutional situation associated with water resources within selected river basins in the five DMCs, and based on that assessment, to develop and initiate the implementation of policies and institutional strengthening programs that will lead to improved management of water resources used in agriculture.

Scope of the Study

As agreed between the Bank and IWMI, the study covered the following five activities (Section 1.3 of the TA Agreement of RETA 5812 of ADB):

- i. Development of a conceptual framework for analysis of policies, institutional arrangements, functions and resource mobilization related to agricultural water management in the wider context of IWRM.
- ii. Case studies in at least two developed countries to identify key elements of successful water resources management and provide lessons for transfer to the DMCs.
- iii. In-depth institutional assessments and performance studies in five participating DMCs to assess the strengths and weaknesses in policies and institutions responsible for agricultural water management, identifying the major issues facing the countries and the opportunities to meet the emerging challenges.

- iv. Preparation of action plans and processes in each participating DMC for implementation of institutional, policy and strategic improvements based on the findings of the in-depth assessments.
- v. Support for implementation of action plans for policy and institutional reform in the participating DMCs.

Following the TA Agreement, the study initially involved investigations in five selected river basins in five DMCs.¹ Case studies were also conducted in three river basins with more advanced development (Omonogawa in Japan, Murray-Darling in Australia and Brantas in Indonesia) for identifying key elements of successful institutional arrangements for water resources management. The primary research objective of the study was to identify the physical, socioeconomic and institutional conditions that would affect the management of scarce water resources available for agriculture in the context of a framework for IWRM within river basins. Through an analysis of these conditions, the study envisaged to develop strategies for more effective water management institutions in the selected contexts in order to achieve improved management of water resources used in agriculture.

In most of the selected developing-country river basins, not only was there no possibility for further increases in irrigated area but irrigation water was being increasingly diverted for other uses. Therefore, as water was becoming the single most important constraint to any increase in food production, studying the overall water resources management and its impact on irrigated agriculture within a given river basin became a critical need for achieving improved irrigation performance. In many developing countries, water resources systems are owned and managed by the government, and their performance is not by any means optimal. The six developing countries, which participated in this study, share this common concern and recognize the value of developing new strategies for improving the overall performance. The study offers the typology of these six different contexts, which are at different stages of institutional reform processes, for comparison of the relevant institutional issues arising from them, and for facilitating an exchange of experiences among them.

The study was conducted in collaboration with country partners on the basis of a common framework and some methodical guidelines provided by IWMI. The conceptual framework was based on the proposition that water management institutions were intrinsically linked with the socio-technical system. Therefore, the study included three main interrelated areas: technical, socioeconomic and institutional aspects (see Final Report, Volume II).

In each of the selected developing countries, a multidisciplinary research team was commissioned to initially conduct some specific tasks for a diagnostic analysis of the existing situation in the river basin (or the subbasin) selected for the study: identification of its physical characteristics, including water accounting for the basin; socioeconomic and stakeholder analyses, including institutional mapping; and performance assessment, focused on selected irrigation systems within the river basin. Through these diagnostic tasks, the study teams, assisted by IWMI's researchers, attempted to identify factors that impinged on the management of scarce water resources for agriculture in each situation. On the basis of this information, an institutional analysis

¹When the two river basins in Thailand were added to the sample towards the third year of the study only a rapid appraisal was possible.

was conducted with the participation of stakeholder groups to identify appropriate policies and institutional strengthening strategies for improved productivity of water, in a context of IWRM in the basin. Finally, appropriate action plans were developed and their implementation was initiated in selected participant countries.

Chapter 3

Summary of Study Progress

The original plan at the proposal stage was to complete all diagnostic field studies in selected river basins of the five countries and hold a regional workshop in November 2000, so that the year 2001 could be an action phase. This was on the earlier assumption that field studies could be started in early January 1999. However, the final authorization of the RETA was received only at the end of January 1999 and, since then, the organizational activities themselves took some time, and after due consultations with the Bank and the collaborating partners, the Draft Study Inception Report could be completed only in June 1999. Accordingly, the first regional workshop to discuss the draft Inception Report was held in Colombo during 27–29 July 1999.

As planned in the activity schedule of the Study, most of the country-study activities mentioned in the Inception Report were completed by the end of December 2000. A delay in the case of Nepal, which was due to some administrative problems of the consulting institute, had to be addressed by fresh consultancy arrangements to supplement the finished items of work. The work was completed in 2001. The second regional workshop was held in Malang in January 2001.

The deliberations between the study teams and national-level water sector planners started slowly and cautiously. However, IWMI-supported national workshops held in each of the participating countries helped in accelerating this process. Policymakers at the highest level participated in some of these national workshops, and their interest in water sector reforms brought them together at the Ministerial Roundtable Dialogue held in Bangkok, in May 2002.

In general, ADB-supported IWMI's multi-country study on effective water management institutions was able to mobilize considerable interest among policy-level persons in each country. The study teams, within their limited resources, influenced some key stakeholders in the river basins they studied, as well as academics and policymakers at the national level, to move forward in their reform programs. Some details are given in Volumes III and V of the Final Report.

Specific Outputs Expected in the TA Agreement

Development of a Conceptual Framework for Institutional Analysis

This item was implemented by conducting a literature review, and preparing a draft document titled, "The Framework for Institutional Analysis for IWRM in a River-Basin Context." The document was revised on the basis of comments received from IWMI staff, the collaborating partners and ADB, and was presented as a theme paper at the January 2001 Regional Workshop in Malang, Indonesia. A revised version was distributed among all participating study teams, and later published as IWMI Working Paper No. 5. This document (reproduced in Volume II of the Final Report) and the Template for the River Basin Profile prepared by IWMI based on the Framework were presented at the Roundtable Dialogue of the October 2001 Hanoi Water Conference organized by the Global Water Partnership.

Advanced Basin Case Studies

The TA Agreement referring to this item is “Developed Country Studies.” Since a case study of the Brantas basin in Indonesia was also included after a suggestion made by the Bank, this item was termed as “Advanced Basin Case Studies.” Three case studies were undertaken for three advanced basins:

- Case study of the Murray-Darling river basin in Australia was conducted through a consultancy arrangement with the Commonwealth Scientific and Industrial Research Organization (CSIRO) of Glen Osmond, SA and Australia.
- Case study of the Brantas river basin in East Java, Indonesia was through a consultancy arrangement with the Jasa Tirta Public Corporation of Malang, Surabaya, Indonesia.
- Case study of the Omonogawa river basin in Akita, Japan was conducted through the direct involvement of Ian Makin and Tissa Bandaragoda of IWMI in collaboration with the Department of Agriculture Engineering of the Agriculture University of Akita Prefecture.

All three case studies were completed and presented at the regional workshop held in Malang during 15–19 January 2001. Revision of these reports was completed by the end March 2001. These reports are presented in Volume III of the Final Report.

The three case studies provided useful information for designing management systems for river basins elsewhere. In Japan, the Ministry of Construction has the predominant role in river-basin development and management, a position that has been maintained for over 100 years. The role of the public sector is central to water-resources management in Japan, particularly in river basin development and river regulation, but it also encourages farmer groups to have a well-established role based on participatory development and management of natural resources for protection of agricultural water resources. In recent times, numerous land improvement district (LID) schemes have been undertaken in the Omonogawa basin. Although the LID system plays a secondary role in water resources management in Japan, it can be considered as an excellent example of user involvement in management of irrigation and water resources systems.

However, the LID system has grown out of a long experience in communal management of land and water resources. This experience has included many years of bitter and painful conflict among farmers concerning water allocation. The prevailing system for water management has been developed gradually by farmers themselves, subsequently being formalized by the Land Improvement Act, promulgated in 1949. The other key lessons from Omonogawa are:

- Administration of a water-surplus basin does require effective institutions and management structures—to ensure that drainage and flood-control structures are operated and maintained correctly. Also even in water-surplus basins, during times of drought there needs to be a well-documented and effective system available to manage revision of water allocations to ensure that basin-scale impacts are minimized.
- Water-quality issues can be dealt with effectively when each sector involved is able to monitor and evaluate compliance of the other sectors. Here, the function of river regulation by a strong authority is indispensable.

- People-based water management agencies, which focused on agricultural water management, such as the LIDs in the Omonogawa basin, have a major role to play in the management of water resources. With appropriate delegated authority and support, these agencies can be highly effective.
- Omonogawa also demonstrates the value of building up on traditional institutional arrangements, which are time-tested and adapted to local conditions and needs.

The Murray Darling river basin was chosen for study as it typifies a basin where the hydrological boundary extends over several administrative regions and the institutional arrangements are in place for effectively coordinating water management functions in a large geographical area. The basin is managed in a framework that involves the Commonwealth (or Federal) Government, four states and one territory. The framework involves layers of representative bodies that consist of a Ministerial Council, the Murray Darling Basin Commission, and a series of high-level groups interspersed with community representatives. These layers make up the fora where strategies and policies are set out for sharing the water and managing the serious problems of water quality in the basin.

Over the last decade or so, the Murray-Darling Basin Commission has become increasingly aware of the need for the benefits of community consultation. To this end, in 1986, it established a Community Advisory Committee that reports directly to the Murray-Darling Basin Ministerial Council. Today, virtually all commission programs involve a large degree of consultation. Most policy reforms are, at least, discussed with the council and explored through transparent media and meeting-based processes. Draft policies and/or strategies are then released and finalized after a period of time.

The Brantas river basin was selected as a case study to exemplify a single organization (Jasa Tirta I Public Corporation) managing multiple uses of water in a large river basin in a developing country. The guiding principle of the organization is “one river, one plan, and one integrated management.” One river (basin) is a hydrological unit that covers several administrative areas managed as one unit. There should be one integrated, comprehensive, sustainable and environmentally based concept of a development and management plan. One management system should guarantee an integration of policies, strategies and programs as well as implementation of the system for all of its reaches. The scope of river basin management covers the management of the watershed, water quantity, water quality, flood control, river environment, water resources infrastructure, and research and development.

The management system adopted by the organization is based on the application of corporate principles. The organization engages in consultancy services as part of its resource mobilization strategy. A large share of its revenue is derived from government grants. Fees collected from water uses are an important source of finance. However, on the basis of a political decision, the agriculture sector—the largest user of water—is exempted from water fees. Public, private and community participation are considered as important aspects in effective water resources management. Stakeholders are involved at each decision-making level through coordination fora. The government, as the owner of the water resources and their infrastructure, plays the role of controlling and regulating at the national and regional level and exercising its public authority.

Country Studies

The five basin studies in the five initially selected countries² provide a typology of basins for arriving at a few conclusions in a comparative analysis. Two analytical reports were prepared to cover the technical and socioeconomic aspects of the five basin studies. The results of these analyses were reported at the regional workshops held in Malang (January 2001) and Bangkok (May 2002). The two syntheses, “Linking Water Accounting Analysis to Institutions: Synthesis of Five Country Studies” by R. Sakthivadivel and David Molden of IWMI, and “Five-Country Regional Study on Development of Effective Water Management Institutions: A Synthesis of Findings from the Case Studies” by M. Samad of IWMI, form the main commentary in Volume IV of the Final Report.

A few general comments are made here. The findings agree with the working hypothesis of the study that river basins evolve and change over time from both a biophysical and a socioeconomic perspective, resulting in an increasing demand for water. The added value of these development-oriented changes in a basin tends to induce some technical and institutional changes.

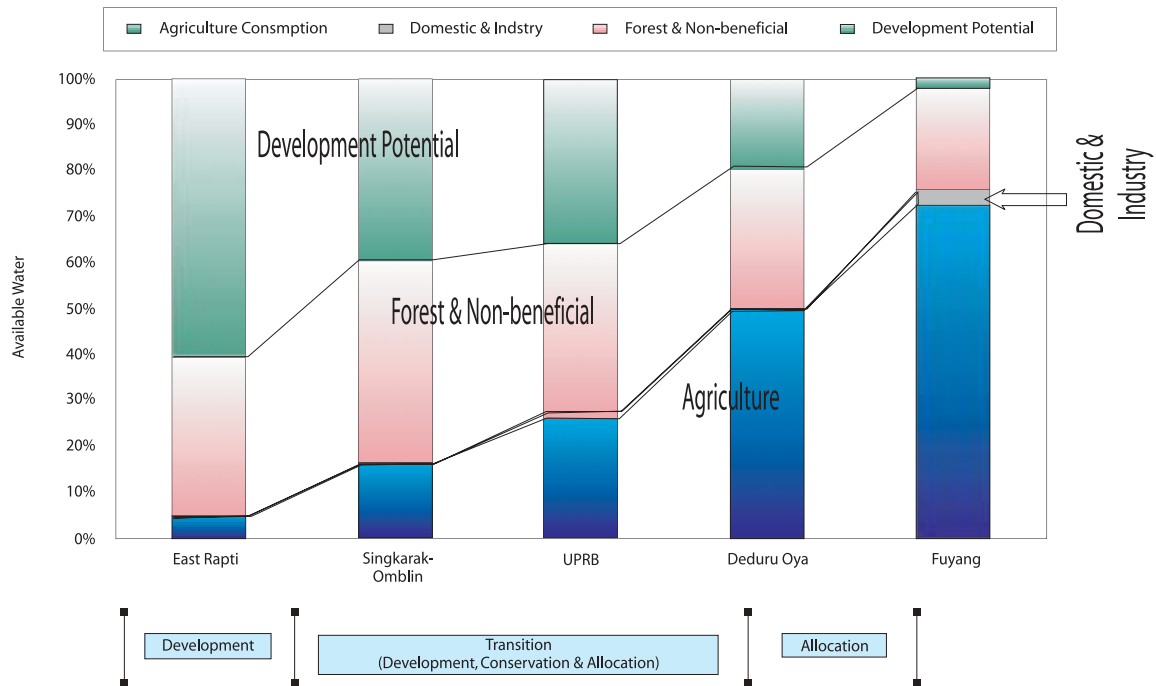
Figure 1 shows the three stages of basin development described by Molden et al. (2001), and illustrates how the five basins can be placed in these three stages: development or construction stage; transition stage where the emphasis is on managing supplies and water savings; and allocation stage in which the river basin has become “closed” in the sense that all extractable water has been allocated to various uses.

For Asia as a whole, the “development stage” has reached a fairly mature level. The opportunities for further expansion of irrigation and other water diversions are limited and greatly constrained by the sharp decline in investment levels and food-grain prices, and associated benefit-cost ratios. Thus attention was focused on improving the productivity of already developed water resources through more effective water management institutions. However, the East Rapti river basin of Nepal has a very large potential for further development of water resources, but moving from left to right in figure 1, the potential steadily declines until the Fuyang river basin, where there is virtually no potential. Even in the Fuyang, domestic and industrial requirements are quite low. The results suggest that compared to domestic and industrial water uses, the requirement for the environment may be fairly large. In other basins located near large metropolitan centers, the relative allocations among sectors may be very different.

With common problems of lack of reliable data, inadequate planning, absence of well-defined water rights, and absence of mechanisms for integration of surface water and groundwater development and use, all the five river basins have shown the need for IWRM. There is an explicit recognition of the river basin as the unit of management of water resources. A growing scarcity of water and inter-sectoral competition for water are shared concerns, with a tendency to give priority to water for domestic use and industry over allocations for agriculture, the need for clearer definition of water rights, and the recognized importance of groundwater. Further, groundwater management, water quality issues and committing water for environmental purposes are emerging as important issues.

²Analysis refers to the five initially selected basins, as only a rapid appraisal for limited information was conducted in the two basins selected later from Thailand.

Figure 1. Development stages of the five river basins.



The generic lessons from the overall study are:

- The study has shown that there are clear stages to river basin development. The development responds to the changing pattern of demand for water over time, linked to population growth and economic development.
- There is a clear need to focus on improved data collection and transformation of these data into useful management information. This information needs to be broadly shared with stakeholders.
- There is an urgent need for clearly defined water rights. Without clear understandings about water rights and effective enforcement, the poor and disadvantaged groups are vulnerable to losing access to water.
- Case studies on advanced river basins (Japan and Australia) suggest that formal River Basin Organizations (RBOs) are not an essential feature of successfully managed water-scarce river basins. Other arrangements, including various kinds of committees and networks, can often work just as effectively.
- There is a clear need to design effective mechanisms for stakeholder consultations and enlist their cooperation in implementing programs for developing and managing water

resources. Well-designed stakeholder-driven institutions are more likely to have positive outcomes, as in the case of LIDs and Murray-Darling.

- The best practices of Murray-Darling, Omonogawa and Brantas suggest that institutional development has been a slow process taking decades. There is a need for more research on appropriate institutional arrangements and the sequence in which new arrangements should be introduced.

Action Plans

All of the five country teams prepared action plans after 2 years of field studies and presented them at the second regional workshop held in Malang in January 2001. On the basis of comments received after the workshop, the teams started discussions and deliberations with appropriate national authorities to initiate implementation (these action plans are given in the Final Report, Volume IV, Appendix II). For varying reasons, mostly of a political nature, some countries could not initiate implementing any action plan. Finally, only three countries were selected for follow-up of this study activity: Philippines, Sri Lanka and Indonesia.

The most significant attempt by the study at developing an organization for coordinating water allocation was undertaken by the study team in the Philippines. A Concept Paper prepared by this team was widely shared among the stakeholder groups in the UPRB, and their comments were received regarding the need for, and the method of, establishing a Coordinating Committee (CC) to coordinate various water uses in the basin. The final Concept Paper, which was prepared after incorporating various suggestions and comments at the first meeting, was presented at a meeting of all stakeholders chaired by the Governor of the Nueva Ecija Province. The main feature of these efforts is the formalism in the form of an agreement reached by the stakeholders. A document titled “Declaration of Commitment” was signed by seventeen key persons representing various stakeholder interests, including the Governor himself, and five Mayors in the basin area. A series of stakeholder meetings led to the initiative by the study team and the local authorities to establish the UPRB Coordinating Council. At the national Workshop held during 17–18 April 2002, the UPRBCC was formalized by the signing of an Administrative Order by the Governor. At this meeting, a Working Group (Executive Committee for the UPRBCC) was also identified by the stakeholders. Should this locally inspired effort succeed, there is a good potential of seeing it replicated in other basins.

In Sri Lanka, the IWMI study team supported the recently vitalized Water Resources Secretariat (WRS) and offered an excellent pilot-study site (Deduru Oya river basin) for institutional development aimed at integrated river basin management. Intense stakeholder consultation made it possible to motivate some key actors in this basin, provided a solution to an unforeseen legal obstacle for establishing an RBO in a transboundary situation (Deduru Oya basin is covered by parts of two Provinces: Central and North Western), and paved the way for a participatory approach to develop a comprehensive river basin plan. The WRS is proceeding with the plans to establish an RBO for the Deduru Oya basin.

In Indonesia, the study team was instrumental in promoting a working group to establish Provincial Procedures for IWRM in the West Sumatra Province. The study team facilitated three rounds of dialogues with water stakeholders in the Padang Province. As an outcome of this interaction process, Padang prepared a draft document, the “Provincial Water Regulations.” This

document was further processed and finalized and presented at the National Workshop held at Bukittingi in Padang Province in April 2002. Representatives of a number of Provinces in Indonesia, and key officials from water-related agencies in Jakarta attended the meeting and ratified the draft regulations. Indonesia had formulated a good legal framework for IWRM, but had not proceeded towards developing provincial-level operational procedures. The draft document prepared in consultation with Padang authorities can be a good model for other Provinces as well.

Promotion of National Efforts for Water Sector Reforms

Each of the six country teams had a series of consultations at the basin, subnational and national level to discuss the issues, constraints and prospects of proceeding with water sector reforms. A panel of IWMI experts visited these countries and assisted the study teams in this process. As an additional study output, policy analysis reports were prepared by experts commissioned by IWMI for the purpose. The countries covered by this effort were: China, Indonesia, Philippines, Sri Lanka and Thailand. Chapters 2 to 6 of the Final Report, Volume V present these reports.

As might be expected, the problems in the water situation that the five countries face are very similar. Growing water shortages under increasing population pressure exacerbated by advancing urbanization and increasing industrialization, emerging competition among different water uses, progressive degradation of water quality and unabated environmental damage in catchment areas are common problems. All countries suffer from periodic floods and droughts.

All countries have been sensitized, to different degrees, to the need for a holistic approach to water resources management. In addition to local situational compulsions, it is quite apparent that the new global awareness on sustainable growth, reaching a peak with the Rio Earth Summit, has affected all these countries. Donor agencies also have played a crucial role. Some countries, as the reports show, needed (and perhaps will continue to need) more persuasion than others. Some have embraced IWRM with open arms. Others are still struggling to do so.

The concept of state ownership of water which China and the Philippines have adopted unequivocally would no doubt have eased conceptual problems in regard to state intervention in water resource matters in these countries. Sri Lanka's policy declaration also embraces the concept of state ownership of water.

There appears to be some consensus on the following elements of policy:

- River basin to be the unit of planning and management (although prescription does not seem to have been yet convincingly translated to practice).
- The need for some high-powered apex body for policy coordination and monitoring of implementation (almost all are beset at present with a multiplicity of agencies with overlapping and/or conflicting jurisdiction, with the apex body in several cases yet apparently a distant dream).
- Introduction of participatory management at the lower end of the service provision spectrum (secondary or tertiary segments of irrigation schemes to be managed by farmer organizations [FOs] and some small rural water supply schemes to be managed by community-based organizations).

- Bringing in the private sector for the sake of anticipated operational efficiency and perhaps more importantly as a means of bridging the investment resources and O&M funding gaps. Various incentives are on offer. Except for some schemes in the Philippines (including the supply system for Metro Manila) the reports do not highlight any private sector schemes in operation.
- Water Allocations and Water Rights/Entitlements: The principle appears to be universally accepted, but some countries seem to hesitate to introduce the regime. The justification for allocation is that water as a scarce resource must be equitably distributed among competing uses in a way that will maximize the public good. An institutionalized allocative mechanism is necessary as market forces will not come into play on account of the nature of the ownership of water as a commodity.
- Water charges and cost recovery: The need for charging an economic price for raw water and the need for cost recovery in the case of all uses is universally accepted (subject to various caveats) but some countries do not seem to have made up their minds yet regarding implementation because of the political sensitivity of the issue. Regarding irrigation water, a compromise solution attempted in some countries is to let minor schemes and/or the secondary/tertiary segments of major schemes to be managed by FOs, which will appropriate an irrigation fee and utilize it for O&M. It has been suggested that the possibility of using voluntary labor for such work in countries with such a tradition in regard to community projects might facilitate such an arrangement.
- Further, in regard to irrigation water and domestic water supplies to less-affluent communities (rural as well as urban), some countries recognize a need for refraining from recovering full cost. In the Philippines, the accepted policy is to charge full cost (depreciation as well as O&M) in urban areas while in urban low income communities as well as rural areas it is partial recovery of O&M with cross subsidization. Some policy regimes specifically require the “capacity to pay” consideration to be taken into account. Universally, the predominant attitude is without doubt, that the peasant and the low-income city dweller is entitled to special treatment in the matter of cost recovery. In the case of the peasant the social consideration is buttressed by the socioeconomic concern of not jeopardizing food security by unwelcome intervention in traditional practice.
- Almost every country (other than those yet without the necessary legal provision) has adopted “the polluter pays” principle and levies effluent charges. At the same time, financial incentives are offered for introducing effluent-abatement facilities.

Where reforms have had a smooth passage, political will has played a crucial role. Conversely, some countries have had to face the apathy and have barely concealed hostility of higher echelons of the administrative hierarchy, who fear the loss of power and rent-seeking opportunities implicit in some reform measures.

A few highlights of some of these reports are given below.

Sri Lanka

The demand for water has increased over the years in Sri Lanka and will continue to increase in view of the accelerating tempo of urbanization, population growth, industrialization and agricultural intensification. The general objective of IWRM, as it is applied in Sri Lanka, is to make certain that adequate supplies of water of good quality are maintained for the entire population of the Island, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases.

Sri Lanka's challenges in water resources management include seasonal shortages of water for irrigation, domestic use and hydropower generation as well as a degradation of the quality of surface waters through domestic and industrial effluents and agricultural runoff. Hence, during the past several decades, the Government of Sri Lanka made several attempts to institutionalize a coordinating mechanism amongst the plethora of sectoral agencies in the water domain to resolve the water allocation issues. The competitive user agencies fell within the purview of independent and separate Ministries in charge of the subjects of Land, Mahaweli Development, Energy and Urban Utilities.

Since the early sixties, several attempts have been made for institutional reform in Sri Lanka's water sector. In 1964, the Water Resources Board was established to advise the minister responsible for irrigation on water management issues such as the formulation of national water policies, integrated water resources planning, river basin and trans-basin development coordination and project coordination in general and the prevention of water pollution. Despite its mandate, the Water Resources Board has not functioned as a water management advisory body. At present, it carries out hydro-geological investigations and the development of groundwater through the drilling of tube wells. In 1980, a Water Resources Bill was drafted by the Ministry of Irrigation, Power and Mahaweli Development. This draft legislation made provision for bulk water allocation to various sectoral agencies and for the establishment of a National Water Resources Council as an advisory body under a "minister in charge of water resources planning." However, the legislation could not be submitted to Parliament due to a lack of Cabinet support.

With the formal approval of the policy of "Participatory Management of Irrigation Systems" in 1988, the Government of Sri Lanka called for substantial devolution of authority and responsibility to FOs. In order to facilitate the implementation of this policy, the Irrigation Management Policy Support Activity (IMPSA) was designed and implemented by the International Irrigation Management Institute (IIMI) with USAID assistance. It executed a systematic and analytical planning process to assess experiences and formulated policies and guidelines for implementation of the new irrigation management policy. The outcome of IMPSA was expected to be a broadly participatory activity involving a wide range of stakeholders including specialists, policymakers, irrigation managers and farmer representatives with an emphasis on achieving a broad consensus on future directions. The project highlighted the need to address competing demands for water in the light of limitations of available water resources. IMPSA was initiated by the Ministry of Lands, Irrigation and Mahaweli Development and the Ministry of Agricultural Development and Research.

In its 1992 summary report, the Irrigation Management Policy Support Activity (IMPSA) made recommendations on land, watershed and water resources management. That report recommended that the government should establish a high-level, advisory National Water Resources Council and Secretariat. The functions of the proposed Council would include the development of national

water resources policy and law and a national water resources master plan. The IMPSA report also recommended “a comprehensive water policy that looks at water in a holistic way, to put water to the most beneficial use at the least cost, so as to conserve it without degrading the environment, sustaining it for future generations as well.”

A proposal to carry out a water resources master plan was presented to external support agencies in 1992. As a result, in late 1993, the Asian Development Bank funded the “Institutional Assessment for Comprehensive Water Resources Management (IACWRM) Project” to assess the institutional capacity for water resources management. Its outcome was a strategic framework and an action plan for comprehensive water resources management. The action plan focused mainly on the need to develop a National Water Resources Policy, to establish a permanent institutional arrangement for water sector coordination, prepare and enact “The National Water Act” and amend other related legislation, establish a system to provide information and data to decision makers and carry out comprehensive planning in selected watersheds. The Technical Assistance (TA) included broad consultation with the government agencies, water-related private sector groups and NGOs and other donor agencies. A strategic framework and an “Action Plan for Comprehensive Water Resources Management” were drawn up to establish the improved institutional framework over a 3-year period. The project recommended the formation of a temporary Water Resources Council (WRC) for a period of 3 years to oversee the implementation of the Action Plan and to recommend permanent institutional arrangements for water resources management. Concurrently, the second TA project funded by ADB, “Institutional Strengthening for Comprehensive Water Resources Management” and FAO/Netherlands-funded “Water Law and Policy Advisory Programme” were developing water legislation and assisting groundwater policy development. On the basis of these recommendations the national Cabinet approved, in 1995, the implementation of the Strategic Framework and Action Plan for the “Institutional Strengthening for Comprehensive Water Resources Management” (ISCWRM) project. As a result of these recommendations, the Government of Sri Lanka established a Water Resources Council (WRC) and a Water Resources Secretariat (WRS) in 1996. The ADB approved funding of the project over a 30-month period beginning in April 1996. Parallel funding for legal and policy assistance was provided under the FAO/Netherlands “Inter-Regional Water Law and Policy Advisory Programme” over approximately the same period.

These projects resulted in producing the “National Water Resources Policy and Institutional Arrangement” and the “National Water Resources Authority Bill.” The National Water Resources Policy was approved by the Cabinet of Ministries in March 2000. The draft National Water Resources Authority Bill was released by the Legal Draftsmen’s Department in September 2000. However, this has been subsequently revised on comments given by the Water Resources Council and the present available document is the fifth revision of the National Water Resources Authority Bill. Subsequently, the policy was revised due to public concerns expressed on certain sensitive issues and the revised Bill is due to be submitted to the Cabinet of Ministers for approval. The bill is still receiving mixed reactions from various political groups. According to the current situation, a new version of the National Water Resource Authority Bill is expected to be finalized in 2003.

A few suggestions being surfaced at this stage are:

1. The growing competition for water between irrigation use for food production by the farmers and domestic use for drinking and personal hygiene by both the urban and rural consumers needs urgent resolution. This can only be achieved by agreeing on a set of guidelines for conflict resolution to be implemented by a nonpartisan body such as the

National Water Resources Authority (NWRA). The guiding principles for such water allocations, particularly under water stress situations, as during a period of drought, need to be backed by appropriate legislation. Currently, there is a “free-for-all” situation where the contending sectoral interests are resolved by means of greater “political” clout. The formulation of appropriate legislation setting out the principles of “priority water allocations” needs to be based on socioeconomic, financial, environmental, technical and political considerations. Case studies that illustrate the competing rights for limited water must be documented and analyzed in order to formulate policies and procedures, which would assist in resolving such issues. A case in point is the Anuradhapura water supply scheme that brings into sharp focus the conflicting situation in executing sectoral mandates.

2. A system of “water entitlements” is likely to fail if the categories of “reasonable use” are not defined in the legal enactment. Rights to extract and use surface water and groundwater are based on two principles, which should be modified to suit Sri Lanka’s situation. These are the doctrines of riparian rights and prior appropriation. The riparian doctrine gives the occupier of land bordering a stream a right to make a reasonable use of water and imposes liabilities on upper riparians who unreasonably interfere with that use. The reasonable use should be defined to include only withdrawals by manual means to protect “chena” cultivators and not commercial farms, hotels or industry. What about underground water? Can a landowner be regarded as owning the water underneath his land and permitted to take whatever quantity he could capture? An occupier’s use of groundwater must be reasonable. This “reasonable use” must exclude mechanical means of pumping, for which purpose an “entitlement certificate” should be obtained specifying the conditions, limiting the quantities that can be drawn. These doctrines must be discussed and agreed upon, if the new policy is to make any headway.
3. The delegation of water resources management to the lowest appropriate level necessitates educating and training water management staff at all levels and ensuring that women participate equally in the education and training programs. Particular emphasis has to be placed on the introduction of public participatory techniques, including enhancement of the role of women, youth and local communities. Skills related to various water management functions have to be developed by municipal government and water authorities, as well as in the private sector, local/national nongovernmental organizations, cooperatives, corporations, and other water user groups. Education of the public regarding the importance of water and its proper management is also needed. To implement these principles, communities need to have adequate capacities. Those who establish the framework for water development and management at any level, whether international, national or local, need to ensure that the means exist to build those capacities. The means will vary from case to case. They usually include: a) awareness-creation programs, including mobilizing commitment and support at all levels and initiating global and local action to promote such programs; b) training of water managers at all levels so that they have an appropriate understanding of all the elements necessary for their decision making; c) strengthening of training capacities; d) appropriate training of the necessary professionals, including extension workers; e) improvement of career structures; f) sharing of appropriate knowledge and technology, both for the collection of data and for the implementation of planned development including nonpolluting technologies and the knowledge needed to extract the best performance from the existing investment system.

4. Sri Lanka's past experience in being unable to get a majority acceptance on the proposed reforms indicates that it is prudent to achieve the most important broad objectives first before the sensitive issues are presented. Any attempt to achieve all the multiple objectives aimed at the sectoral users, such as demand management and cost recovery, would retard the progress on the major task, namely the bulk allocation strategy. The demand management section particularly gives rise to fears of "attempted sale of water." While the cost-recovery fees have been well established for over two decades with respect to drinking water, not much progress has been made for user cost recovery for irrigation water. When the IWRM policy document refers to principles of cost recovery whereby the beneficiary or the water user is called upon to bear the cost rather than the entire society, much leeway is given to those who champion the protests. Consequently, many middle-roaders emphasize the currently achievable tasks. The summary recommendations of an Expert Study Group set up by the National Science and Technology Commission refer to the objections to transferable water entitlements and pricing, which would render water a marketable commodity. It laments the lack of measures for catchment or watershed protection and measures against pollution of surface water and groundwater. Clearly, these are the functions of proposed river basin agencies and the Central Environmental Authority.

In order to go forward in this apparent tangle, the best option for the IWRM Policy initiative is to tackle the more important problem first, namely the bulk water allocation by a nonpartisan authority. The National Water Resources Policy completed in March 2000, should serve as the cornerstone for the development and utilization of water resources over the time horizon to 2020. Policy includes efforts to ensure water availability to all the inhabitants through a system of bulk entitlements, appropriate institutional changes and a legal and regulatory framework. The policies outlined for various sectors can be implemented later, based on the success of broader reform measures.

Indonesia

Since 2000, the most gratifying impact of the reform agenda is the development of a participatory irrigation management approach originating from Inpres 3/99. Field-tested procedures have been developed to date for a) participatory design and construction whereby all designs are developed in consultation with WUAs and WUA federations play a role in construction; b) formation of over 300 empowered WUA federations involved in O&M of their secondary systems; c) the field-testing of a framework for irrigation management transfer based on Service Agreements between WUA federations and the irrigation agency; d) establishment of an NGO Consortium, which is responsible for recruiting, training and supervision of Community Organizers to help with capacity building of WUA federations; e) collection of irrigation management fees by WUAs, which are used for O&M expenses; and f) field experiments with simple WUA federation financial assistance mechanisms that serve as a precursor to the Kabupaten Irrigation Improvement Fund concept.

By December 2001, 39 districts in Java, Sumatra, Sulawesi and West Nusatenggara had issued memoranda of understanding to adopt the reform program and establish an irrigation planning unit. Federated WUAs had been established in 227 irrigation systems, with a total area of 353,778 hectares. Legal transfer of authority had been implemented in 53 schemes in Java, and 26 schemes had made service agreements between scheme-level WUAs and the kabupaten government and/

or contractors. With the December 2001 issue of a new Government Regulation (PP) for irrigation, the country is now ready to apply field-tested procedures for participatory irrigation management. In fact, ADB is finalizing a project based on applying the new PP and the above procedures.

As against this success in irrigation management reforms, the overall reform agenda has had little impact on basin management so far. Only one new river basin corporation is in the process of being established. Balai PSDA have been established in the key river basins of eight provinces (only two basins in each of five off-Java provinces). Establishment of Balai PSDA and their improvement as viable organizations is really attributable to donor-supported projects and not driven by the reform agenda itself. Similarly, these projects have also brought about conceptual improvements in basin management planning. They have also introduced the concept of making Balai PSDA basic hydrographic units and keeping Provincial Hydrological Units as oversight agencies to ensure quality of data.

As of August 2002, the number of completed outcomes is not large. Many Task Force drafts are available but these have not been processed and issued. Some of the completed outcomes are outlined below.

- *Presidential Decree for the Establishment of a Revised “Inter-Ministerial Coordination Team (Tim Koordinasi) for Water Resources Management” and, Coordinating Minister for Economic Affairs (Menko EKUIN) Decrees for Establishment of Its Secretariat and Working Groups for Water Resources Sector Policy Reform Implementation.* This is not a reform as such, as a Tim Koordinasi was established in January 1999; instead, it accommodates the new sector structure and has all the coordination functions necessary for the water sector. The Tim Koordinasi is supported by a large Secretariat having a Steering Committee of sixteen Echelon 1 officials from various ministries. The Steering Committee is supported by a Supervision Team and four Working Groups similar to those of the WATSAL Task Force (institutions, river basin, water quality and irrigation). Upon issue of the new water resources law, it is expected that the new Tim Koordinasi will become a National Water Council with stakeholder membership.
- *Coordinating Minister of Economic Affairs Decree for Direction of a National Water Resources Policy (NWRP).* This is not quite the type of document originally envisaged as a presidential decree based on recommendations of the National Water Council; however, it is the first time a declared set of national policies for the water sector has been enunciated and issued operationally. This policy is expected to be further elaborated by the National Water Council. The NWRP has vision and mission statements followed by 75 policies that cover the following areas: a) water resources management, b) water resources conservation, c) control of water damage, d) empowerment and involvement of the community and private sector, and e) increasing transparency and availability of water resources data and information. Compared to earlier policy statements, this document is quite revolutionary in its integrated and sustainable approach to water resources management.
- *Memorandum of Understanding between 14 Director General-Level Line Agency Managers Endorsing the Concept Paper for a National Integrated Sector Data Network, Its Framework, Procedures and Implementation Arrangements.* The concept paper was accepted by the WATSAL Steering Committee but the World Bank required some form of commitment that the agencies involved would continue to work toward an integrated

data network by setting up its administrative framework within the government structure as well as planning for the procurement of its hardware. This was accomplished by the MOU.

- *Decree of Director General of Water Resources for “Establishment of Water Resources Data and Information Unit” in the Ministry of Settlements and Regional Infrastructure (KimPrasWil).* With ADB support, a Water Resources Data Center was established in KimPrasWil linking its central data base and 400 PCs. The primary function of this system, in addition to data, is to provide standard reports and maps for regular users. The web-based applications include: a) an Irrigation System Inventory, b) Natural Disaster and Flood Monitoring, c) Water Resources Inventory, d) Hydromet Infrastructure Inventory, e) Project Monitoring, and f) Sector Information.
- *Decree of Minister of KimPrasWil for “National Hydrology Management.”* In addition to a clause in the new water resources law supporting strengthening of hydrology activities, the new PP on Water Management will explicitly support hydrology management. The KimPrasWil decree gives the necessary legal basis for its funding, delegation of authority, organizational structure, data collection and quality, as well as recognizing the hydromet network as an infrastructural asset to ensure its sustainable O&M funding.
- *Decree of Minister of KimPrasWil—“Technical Guidelines for Preparation of Regional Regulations on Hydrology Management.”* Two guidelines are issued for regional government management of hydrology.
- *Completion of Establishment of Provincial Hydrological Units in Ten Provinces and Balai PSDA in Key Basins of Eight Provinces.* This requirement is essentially completed.
- *Government Regulation on “Water Quality and Pollution Control.”* The new PP 82/01 for the first time provides for the regulation of all polluters (including municipalities and mining) and, for levying wastewater discharge fees to support water quality monitoring and basin-level water quality management. Its other provisions are similar to the framework in the old PP 23/82 that it replaces. The new PP with its accompanying Guidelines for provincial and kabupaten legislation and procedures is by far the most significant and integrated reform accomplished so far. It completes a major commitment of Objective 4 of the WATSAL Letter of Sector Policy and Policy Matrix. However, it is still operationally incomplete, as the all-important decrees/ministerial guidelines on restructuring of regional government irrigation agencies and new irrigation financing mechanisms have still to be cleared by both national and regional governments.

A number of additional risks have arisen during the reform process which may affect the completion of future programs. These risks include:

- Three out of the four new river basin corporations may not be established because of the difficulty of reaching agreement about revenue sharing between provinces and kabupaten and the desire for provincial control of a potential revenue source.

- The transactions costs of developing financial incentives (such as corporate tax deductions) for industry investment in pollution abatement facilities may be too high and such incentives may never be agreed to.
- In practice, stakeholder representation may be a “toothless” arrangement unable to really confront powerful vested interests (such as a power company in the Ombilin basin).
- The Task Force may no longer be motivated to work hard because many of its products have been, or will be, altered to suit conservative interests.

The following important conclusions and lessons may be learnt from these reform efforts:

- Effective sector reform requires a very high-level “Champion” with a perception of crisis. The comparison between the successful far-reaching irrigation management reform in Andhra Pradesh, India and the limping reform in Indonesia is instructive. In Andhra Pradesh, irrigation costs played a large role in a fiscal crisis during the tenure of a Chief Minister who subscribed to a community participation ideology. Having seen a demonstration of what WUAs can achieve, he proceeded to enact a model “Farmer Management of Irrigation Systems Act” despite opposition from the irrigation bureaucracy and personally supervised its implementation. In Indonesia, the sector reform champions are middle-level officials who do not receive strong support in the higher levels of the lead sector ministry while their strong support comes from peripheral ministries and agencies that do not have the power to really confront the lead ministry. The lead ministry does not have an overall perception of the need for reform and goes along with those reforms that do not strongly threaten its bureaucratic and staff interests. Its concerns of loss of power and budgets as a result of the government decentralization far exceed its interest in improved performance and professional improvement. Consequently, the reform process is driven more by the “financial” carrots of loan disbursement and World Bank pressure than by a genuine motivation within the government. It is fortunate that decentralization has developed regional power bases that see the reform agenda as increasing their authority and are willing to try new approaches even if the national legislation is not forthcoming.
- A Comprehensive and Lengthy Adjustment Operation is Riskier than Several Short Operations but Unavoidable under the Particular Circumstances of Indonesia. WATSAL is a simultaneous reform lasting 3 years instead of its planned 18 months. The causes for delay lie in the political-economic turmoil that has wracked Indonesia since 1998. It could be argued that a less ambitious approach would have been to have two or three sequential adjustment operations starting with the all-important irrigation management first. However, in retrospect, this alone has turned out to take 3 years. A follow-up reform for water resources management would also take another 3 years in view of the need to change a basic law and its regulations. However, there are close symbiotic relationships between the irrigation reforms and those of water resources management: separate operations would mean that these relationships would have been lost with both areas having weaker reforms. In retrospect, the need for sector reform was so great in 1998 and the national reform atmosphere so strong, that the decision to embark on one large holistic reform agenda was justified. Allowing for the unforeseen mitigating circumstances of the uncertainties

and difficulties created by governmental decentralization, responsibility for failure to accomplish the reform (if this occurs) must rest squarely on MPW/KimBangWil/KimPrasWil and less on the successive Cabinets. While the name of the ministry may change, the lead officials by and large do not. It can only be hoped that the “winds of change” will not die down after WATSAL closure and that reform will continue, albeit at a much slower pace.

- One of the most pleasant surprises of the reform process has been the emergence of policy-analysis ability inherent in many Task Force members and some national consultants. This vindicates the Government of Indonesia-Bank approach of not using full-time foreign consultants to do conceptual work, but relying on experienced Bank consultants and experts for guidance and advice to the Task Force. It goes without saying that a select core group of about 20–25 people working full-time for the Task Force could have yielded quicker and possibly better results. Unfortunately, the right people are the best trained and most professional staff in the civil service and it is inconceivable that, in a country where such talent is in short supply, they could be removed temporarily from their duties. It should also be remembered that ideas take time to gel, especially where a process of deliberation is needed to change entrenched opinions.

China

At the inception of the People’s Republic of China in 1949, the Government of China declared its policy of planned utilization of water resources on the basis of river basins. In the 1950s, River Basin Commissions were established, and River Basin Plans were prepared, the main concern being floods and droughts. Major construction works related to these problems were undertaken.

The first breakthrough in the direction of IWRM, though without formal recognition of the concept (the genesis of which itself was some years into the future) took place in 1988 with the passage of the Water Law. This law is credited with having laid down the initial groundwork for IWRM. The Water Law was followed during the next decade by several other pieces of legislation relating to soil conservation, flood control, environment protection, water pollution and land administration all of which went to strengthen the increasingly more holistic approach to water management.

The next most crucial step was the adoption by the State Council in 1994 of “China’s Agenda 21-White Paper on China’s Population, Environment and Development in the 21st Century.” The adoption of this document was in direct response to the adoption of Agenda 21 by the world environment summit in Rio in 1992. The objective was the sustainable development and conservation of natural resources which included water.

It was declared in this document that “China will reform the existing management system for water resources, pass new legislation and establish economic systems to promote integrated planning and management and to maximize development and protection of water resources for industry, urban development, hydropower generation, inland fisheries, transport, entertainment and maintenance of ecological balance. China will also work to improve the competence of management and technical personnel and promote public participation in the integrated management of water resources.” This was a clear and unequivocal commitment to IWRM. Under the impact of the above commitment, much research was done for the reform of the legal and

institutional framework relating to water management. International best practices were also examined.

As a result, the Water Law of 2002 was formulated and promulgated that, in fact, improved on the provisions of the Law of 1988. This could be considered as the basis for a very comprehensive and advanced legal and institutional framework for IWRM. The major provisions of the law from the IWRM perspective are the following:

- Water resources are owned by the state.
- The law is formulated for the rational development, utilization, saving and protection of water resources, for the prevention and control of water disasters and for the realization of sustainable utilization of water resources in order to meet the needs of national and social development.
- The above objectives are to be realized through comprehensive planning at national level (a National Strategic Master Plan), at river basin level and at subnational political units levels. Multiple uses, interests of all stakeholders (upstream/downstream, left bank/right bank and other) and ecological concerns are to be taken into account. Plans are to be consistent with national, economic and social plans as well as specialty plans relating to flood control, etc. (There is specific provision for harmonizing competing uses of water.)
- System of water allocations and water permits based on allocation plans.
- Priority for domestic consumption.
- Water user fees to be charged based on volumetric measuring.
- Systems for water conservation and water savings.
- River basin to be focus of planning and management (through River Basin Management Agencies) at subnational level (in conjunction with planning/management at/by politico-administrative units).
- Setting up of data and information systems at all levels.
- Establishing supervision, monitoring and dispute resolution systems.

There has been supportive legislation, notably the Environmental Impact Assessment Law of 2002 (water development projects being subjected to environmental considerations) and the Rural Land Contracting Law (facilitating investments in irrigation by small farmers through the grant of more security of tenure). The Water Law of 2002 enacted only in October of that year has yet to be supplemented with many directives to be issued by the State Council and other authorities, and it needs to operationalize its many provisions.

Actions in introducing IWRM: Successes and failures

The policy of introducing IWRM has been unequivocally declared in the 1994 policy statement, China's Agenda 21. This represents a well thought-out firm commitment. The Water Law of 2002,

building up on the 1988 Water Law, has laid down a comprehensive legal and institutional framework for the implementation of IWRM. The plan for the development, conservation and utilization of water, keeping in mind the multiple uses of the resource, the multiple concerns relating to it, the multiple stakeholders and the requirement of the water plans being in conformity with broad national economic and social development plans, has been given legal recognition and thereby made mandatory. The position of water as an economic good, with an economic price, has been legally recognized.

These are solid achievements. What remains is to graduate on to actual implementation. In regard to implementation also, there has been some degree of institutional reforms. Concerned Ministries and their departments have been streamlined. At local levels the holistic concept has been recognized in some geographical areas by the conversion of “water bureaus” to “water affairs bureaus.” “Water User Associations” (WUAs) transacting contractually with “Water Supply Companies” have come into being in the countryside in relation to irrigation water (over 2,000 in 19 provinces). The maintenance of field level delivery structures is becoming the responsibility of WUAs. Through such arrangements the concept of self-management by users is coming to the fore.

The dissemination of information relating to water is also rated a success story with several journals and newsletters propagating not only local but international water news, research findings, etc., on a regular basis.

With all these achievements and despite the institutional reforms referred to above, some major weaknesses remain in the institutional arena. Two significant weaknesses are: a) overlapping and fragmented jurisdiction and b) weak institutional capacity for the heavy dose of integrated planning that is envisaged. However, it would be unfair to characterize these as failures because the problems have been duly recognized and, apparently, there is a relentless search for improvements.

Circumstances, which enabled the introduction of IWRM in China

- The culture and industriousness of the people.
- Recognition of the needs, problems and the range of possible solutions relating to water, by those concerned, through the medium of many studies, workshops, review of international experience and expert consultancies.
- Shift to a market economy.
- China’s admittance to the WTO which has significant implications for natural resources development and interdependent economic development.
- A constitutional amendment in 1999 which laid down the “rule of law” principle and legislation on related matters, such as the environment, pollution control and soil erosion, which focused attention on a holistic approach.
- The climate of international opinion and concern created by the 1992 Earth Summit, and developments in other countries arising therefrom, appear to have been major enablers and catalysts.

Circumstances inhibiting the introduction of IWRM in China

- A lack of clear and universal understanding as to the scope and operational policy of IWRM, which affects the lower levels of the politico-administrative hierarchy and the public.
- Overlapping and often conflicting jurisdiction of implementing agencies.
- Lack of adequate and timely data.
- Some gray areas of concern not falling within the purview of any agency.
- The requirement of the State Council approval of plans prepared by Basin Management Authorities and delays experienced in obtaining such approval.
- Noncoordination and nonsynchronization of planning and budgeting processes.
- Overuse of water in many sectors is also cited as an inhibitor to the introduction of IWRM.

Philippines

At an annual renewable freshwater supply of about 4,400 cubic meters per capita the availability of water in the Philippines is more than four times the threshold of 1,000 cubic meters per capita used for classifying water scarcity. However, some isolated areas in certain parts of the country experience occasional periods of water stress and, in 1995, there was a nationwide crisis which prompted even special legislation (Water Crisis Act of 1995). In any case, water availability is expected to decline to about 2,500 cubic meters per capita by the middle of the century.

Basic policy and laws required for systematic management of water resources have long since been adopted together with the establishment of an institutional framework. The Philippines Constitution of 1987 itself stipulates that natural resources including water shall be explored, developed and utilized under the full control and supervision of the state. It further stipulates that water rights will be subject to “beneficial use” limits.

One of the earliest attempts at systematic management of water has been the adoption of a National Water Code prior to 1978. The Water Code makes the very radical declaration that all water belongs to the state. It goes on to categorically include under this declaration, water found on private land, permitting the owner the use of it, without a permit, only for domestic purposes. Even this is liable to be restricted in times of scarcity or for wastage. The Code a) establishes the basic principles and structural framework relating to appropriation, control, conservation and protection of water resources to achieve their optimum development and efficient use to meet present and future needs b) defines the scope of the rights and obligations of water users and provides for the protection and regulation of such rights, and c) establishes the necessary administrative machinery.

A National Water Resources Board (NWRB) has also existed for over 25 years. The NWRB is the regulatory body, which issues water permits and performs other regulatory functions. This body was reconstituted and strengthened in 2002. It now consists of very senior officials of the

level of Secretaries (Chair—Secretary, Department of the Environment and Natural Resources). Representation of bodies which have an interest in its decisions was done away with.

The National Water Summit of 1994 organized by the President of the Republic had been a key milestone in the reform process. These deliberations resulted in the recognition of the need for a coordinated approach in regard to management of water. In response, the President had established a “Cabinet Cluster”—a high-level body of senior officials each with individual responsibilities on various aspects of water—to advise the President and the Cabinet regarding all matters related to water.

In 1995, in response to the prevailing water crisis, the National Water Crisis Act was promulgated. However, the mandate of the high-level Commission established under this Act included action of continuing relevance. These included the study of the entire water supply and distribution sector, instituting mechanisms for the continuous monitoring of supply and distribution, etc. The Act also facilitated private sector investment in the water sector by authorizing negotiations for BOT arrangements (and variants thereof) for the provision and operation of water facilities. The privatization of two public bodies concerned with the supply and distribution of water was also authorized by this Act. In 1996, a high-level Presidential Task Force on Water Resources Development and Management was established as an oversight body to ensure the efficient exploitation and use of water resources. The Task Force duplicated the existing NWRB but drew inputs from a wider spectrum of stakeholders. When the NWRB was reconstituted and strengthened in 2002 the Task Force was disbanded. The Chair of the Task Force, the Secretary of the Department of Environment & Natural Resources (DENR), assumed office as Head of NWRB. In 1996, an Office of the Directorate on Integrated Water Resource Management was established. Its responsibilities are those of an apex coordinating, planning, monitoring and regulatory body.

Initiatives towards river-basin-based planning and management had started as early as 1966 with the setting up of the Laguna Lake Development Authority (LLDA). Several models of such organizations have emerged. LLDA is described as a centrally mandated quasi-government regulatory and developmental organization. Another such organization is a local government-unit-led initiative with representatives of user organizations and academia in addition to officials. A third is described as a department-led arrangement while a fourth comes under the description of a project-led arrangement.

LLDA is governed by a Board consisting of the central government, local government units and the private sector. The operations are handled by a multidisciplinary corps of professionals.

Over the years, the responsibilities of the LLDA have been expanded and now it stands as an organization responsible for the management of the water and related natural resources of the lake and its watershed in all its aspects. Its geographical area of authority covers 2 provinces and 42 towns. The management role extends over several uses of water ranging from irrigation and domestic use to fisheries and transportation.

The authority is resorting to the delegation of its powers to local government units and enlisting the working participation of the local communities (environment protection, etc., through the mobilization of environmental activists into “River Basin Councils” and an “Environment Army”) and users (e.g., fishermen as watchdogs against illicit use) in a significant way. It is also using a private-sector partnership.

Current efforts are directed towards expanding the knowledge base that supports integrated management of multi-sectoral use of the water and training of personnel and institutional development. Several studies in the 1990s and thereafter have lent support to the development of IWRM in the Philippines. These studies have expanded the knowledge relevant to various aspects

of water use/abuse and its management. One of these studies has resulted in the development of a “National Strategy and Action Plan for the Water Supply and Sanitation Sector.”

One of the management reforms introduced in the water sector is the introduction and implementation of a water use permit system. Charging for the use of water is an established principle although its implementation may vary. The National Water Code empowers the NWRB to charge for water. Water charges appear to be made for more than one reason. The first is the recovery of costs related to the provision of water. The accepted policy is that costs should be recovered subject to considerations of capacity to pay. Another rationale for charging (including charging for raw water) is that water as a limited resource must be procured by users at its economic worth to obtain an optimal allocation of resources. Much activity is ongoing to develop methodologies to make this determination—economic price of water. Water charges are also considered as a source of revenue for “more effective water resource development.”

A related charge is the “environmental user fee” based on the principle “let the polluter pay.” A fee is payable by users depending on polluting effluents discharged into the water body. Such a fee is operative in the LLDA area. It is reported to have significantly brought down levels of pollution in the Laguna lake (a 73.6 % reduction in 1999).

Much attention is being paid to the collection of water-related data to support the management effort. However, it is apparently being done at present in a rather fragmented manner. The coverage is also inadequate. Further initiatives relating to this activity will be mentioned in a later section.

Stakeholder and community participation in the activities of LLDA has already been referred to. At the national level too two organizations provide for such stakeholder participation. The Philippines Water Partnership (PWP) is a multi-sectoral—group government, private sector and civil society—that functions as a neutral forum for discussing issues and as an instrument of advocacy with an IWRM orientation. The Philippines Center for Water and Sanitation—ITN Foundation (PCWS-ITNF)—is a similar organization with a bent for IWRM through community participation. It helps mainly community-based water and sanitation projects through the development and dissemination of simple technology appropriate for local projects and through the organization of development work.

The Medium-Term Philippine Development Plan (2001–2004) has explicitly made a commitment towards IWRM. It has declared that IWRM shall be the guiding principle relating to action concerning water. It has declared that sustainable development and management of water resources through appropriate policy and legal reforms, particularly in relation to resource exploitation, allocation, prioritization, optimization, protection and conservation shall be followed. The link of water management to social and economic development and environment concerns has been emphasized.

Current efforts are directed at strict enforcement, maintaining harmony of water management policy with socioeconomic policies and capacity building. The Medium-Term Philippines Development Plan 2001–2004 has called for the development of a pricing mechanism which meets certain objectives. On the one hand, cost recovery and externalities are to be taken into consideration and on the other, capacity and willingness of the different users to pay are to be paid heed to. The National Economic Development Authority (NEDA) has observed that the current approach to pricing raw water leads to wasteful and inefficient use and that it is devoid of any economic basis. NEDA has also recommended volumetric pricing of irrigation water so that a definable commodity transferable to a higher-value use can be created. However, such pricing should not lead to farmers being discouraged to use irrigation water.

Thailand

Agriculture still plays a significant role in the economy. About 14 percent of exports are agricultural and more than 60 percent of the population is engaged in agriculture. Agriculture consumes about 70 percent of the water withdrawals. Demand is ever increasing due to population growth and rapid economic development (on the average, 8% annual GDP growth; urban dwellers are about 18% of the population).

Severe droughts have been experienced. Therefore, water scarcity, exacerbated seasonally, remains a problem. At the same time, frequent nationwide floods also occur. Concerns about the quality of water are growing, and the overuse of groundwater is becoming a problem.

Up till now, the concentration had been on the increase of supply with huge investments on dams and other supply-enhancement projects. Currently, the total storage capacity is around 43 percent of average annual runoff. About 94 percent of the urban population is served with treated pipe-borne water, and 88 percent of the rural population is served with safe drinking water from piped water systems and other sources. This is supplemented in rural areas with water from other sources for other domestic needs.

On the institutional perspective, there is no IWRM policy or planning as yet. Each individual agency does its planning in isolation following its own policy. Little attention has been paid to demand management. In agriculture there is little or no cost recovery while for other users low tariffs operate. Poor allocation and lack of a formal system of water rights adversely affect users, particularly those downstream. Weak political commitment to water management on the one hand, and politicization of water related decisions on the other, seem to characterize the policy environment.

There are no less than 30 water-related laws administered by as many departments. This includes one comparatively recent (1992) law for the regulation of groundwater exploitation. However, no law exists for integrated management of water.

At the national level, over 30 departments coming under the purview of 9 ministries existed till recently. In addition, there are 7 national committees. With “Bureaucracy Reforms” in 2002, the number of relevant Ministries and Departments has been reduced to 5 and 15, respectively. The same situation of multiplicity of agencies exists at river basin level, and there is no overarching coordinating institutional arrangement as yet. Similarly, data exist in fragmented locations as there is no networking arrangement.

Participation of stakeholders in decision making is minimal except that politically powerful groups of water users wield influence in decisions relating to enhancement of supplies. There is no mechanism for resolution of conflicts relating to water. However, the existence of the four-nation Mekong River Commission with Thai membership for managing the riparian rights of the lower Mekong basin is an important feature of the institutional framework.

Significant features of the future outlook for water management in Thailand are the following:

- Thai authorities have given high priority to meeting the UN target of reducing by half the number of people without access to safe drinking water, by the year 2015.
- Budget constraints and environmental concerns militate against the earlier pace of supply enhancement.
- Situational imperatives indicated earlier have prompted the Thai authorities to embark on various measures towards IWRM. A National Water Resources Committee (NWRC)

was established in 1987 to coordinate policy, and the Office of the National Water Resources Committee (ONWRC) was established as its secretariat in 1996. The collaboration between the irrigation department and the electricity-generating authority in the use of water in reservoirs, under the aegis of the NWRC is an illustration of this new trend.

- The new Thai constitution of 1997 has had the effect of creating an environment supportive of IWRM. The state is now obliged to encourage civil society participation in the conservation and management of natural resources. Access to information has been expanded. Decentralization of decision making in regard to natural resources has been enabled.

The guidelines of the 8th National Plan (1996–2001) stipulate that development and conservation of surface water and groundwater should be in accordance with systematic plans drawn up on a river-basin basis taking all socioeconomic and environmental factors into account. In July 2000, the National Water Vision was adopted by the government with the pledge: “By the year 2025 Thailand will have sufficient water of good quality for all users through an efficient management, organizational and legal system that would ensure equitable and sustainable utilization of its water resources with due consideration on the quality of life and participation of all stakeholders.” Thus, a strong commitment has been made, and accordingly, a New Thailand Water Policy has been adopted by the Cabinet in October 2000. The main points in this policy statement are:

- Early promulgation of a Water Act.
- The creation of necessary national organizations (to formulate national policies and to monitor implementation) and river basin level institutions (to prepare water management plans through a participatory approach).
- Equitable allocation of water for all water use sectors while fulfilling basic requirements of the agriculture and domestic sectors, to be achieved through the establishment of river basin specific priorities that, in turn, will be on clear allocation criteria. Beneficiaries to share costs according to service and capacity.
- Formulation of criteria for raw water provision compatible with each basin’s potential and subject to resource and environment conservation considerations.
- Provision of freshwater to farmers equitably in a way similar to the provision of other basic government infrastructural services.
- Conducting of awareness campaigns on the efficient use of water.
- Promotion of user participation in water management.
- Acceleration of flood and drought protection planning.
- Provision of sufficient and sustainable financial support for the above activities.

Under the aegis of the ONWRC, the following initiatives have already commenced:

- Formulating of a comprehensive water management system at the national level involving regulating rights to water, water allocation, licensing, costing of extraction, penalties for illegal use, flood protection and relief.
- Reforming of policies, laws and institutional arrangements relating to the delivery of irrigation water.
- Ten River Basin Committees established.
- Three case studies in regard to the decentralization of water management in the river basin level.
- Formulation of a strategic plan for IRWM in 25 major river basins. Two indicative plans have been formulated.
- Preparatory work for five river basin pilot projects.
- Capacity building including training of personnel.

The four-nation Mekong River Commission of which Thailand is a member is currently undertaking several regional programs for integrated sustainable resources management in the lower Mekong basin. These include a basin development plan, a water utilization plan, an environmental program, fisheries and flood management, and forestry and navigation programs.

Chapter 4

Some Short-Run Study Outcomes

The short-run outcomes of the study are mainly in four interrelated areas:

Awareness Development

Capacity Building

Information Generation

Institutional Development

Awareness Development

The success in developing a wide awareness among the key policy and management levels in the countries concerned on the emerging concepts of IWRM is an effective and substantial outcome of this study. Its impact has already been seen in the interest taken and the initiatives shown by the senior officials and political leaders of the water sectors in these countries. The initiatives and active participation of country delegations in the Johannesburg and Kyoto world summits demonstrate the impact of these efforts.

The chosen study approach helped considerably to realize this achievement. As the study, in general, used the PRA methods, it was able to reach the relevant opinion leaders and stakeholder groups easily in the process of conducting diagnostic studies, as well as during strategy-development consultations. The study team in the Deduru Oya river basin in Sri Lanka provided the leadership in this methodology, and their work is reported in a special paper to be published shortly as part of the study outputs.

The high-water mark of the awareness-building efforts of this study was the Ministerial Roundtable Dialogue, organized by IWMI, the Economic and Social Commission for Asia Pacific of the United Nations (ESCAP) and the Office of National Water Resources Committee of the Royal Thai Government, and held in Bangkok, during 22–23 May 2002. Excerpts from this important regional meeting are published separately by IWMI.

The Joint Statement agreed by the Ministerial Delegations elaborated on an earlier initiative on freshwater called for under the UN-ESCAP, ADB, UNEP Regional Phnom Penh Platform, held in November 2001. This was taken to the Ministerial Prep-Com meeting to be held in Bali, and also referred to at the World Summit on Sustainable Development, Johannesburg 2002. It highlighted common concerns, shared principles and agreed priorities for action concerning water and sustainable development, a subject of vital importance, including regional cooperation and water priorities in Asia, to be brought to the attention of global fora on water resources. The meeting acknowledged that water is now accepted as underscoring, and a vital component of, all aspects of sustainable development.

The roundtable discussion brought together Ministerial Delegations of ten Asian countries to discuss and address the challenges for water and sustainable development in Asia. The ten countries

represented were Cambodia, Indonesia, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka and Vietnam. China could not attend.

One of the factors with a direct bearing on the issues under discussion was the acute shortage of funds for water-infrastructure development and management. The ministers also acknowledged the need to enhance the socioeconomic value of water and to realize its potential for food production, employment generation and poverty reduction. In the course of discussion, areas for regional cooperation were also identified. These were knowledge-sharing opportunities, scope for comparative research, workshops and seminars, training and capacity building. The discussion concluded with a list of water priorities to be addressed in Asia, such as:

- The need for more investment in the development of infrastructure to improve irrigation, drainage, hydropower, water supply and sanitation.
- Reduction of water pollution.
- Protecting and sustaining catchment areas and fragile ecosystems including wetlands.
- Funding for water resources development and management from local communities and governments.
- Minimizing the harm caused by flooding, drought, pollution and diseases.
- Institutional development and capacity building for administration of water rights, decentralization and irrigation-sector reform.
- Maximizing the productivity and social and economic benefits from water resources.

Preceding the Ministerial Roundtable, there was a Regional Seminar based on the two sets of country studies by IWMI and IFPRI.³ Discussions on the regional study carried out by IWMI revealed that countries across the region are facing increasing problems of water scarcity, flooding and pollution, and that IWRM is being introduced to deal with these problems in a river-basin context. Water governance was recognized as important, and policies, institutions and management tools for IWRM are needed to improve water governance at the national, river-basin and community level. Stakeholder participation, transparency, and accountability are important elements of water governance. Research teams and agency representatives from six participating countries attended the seminar.

Capacity Building

The 4-year study involved a large number of participants in field research, data collection and analysis, and report writing. In addition to the researchers, each country team had representatives of operating agencies as members. Inputs from IWMI staff and other experts provided training support throughout the study period. The indirect inputs through these processes would particularly help enhance the research capacity of all collaborating teams.

³Output of the final regional seminar held in Bangkok during 21–22 May 2002 is published separately by IWMI.

Information Generation

New knowledge generation was an anticipated output from this study. So far, eight progress reports have been issued, which have been distributed among the collaborating partners. Among the items published, or to be published by IWMI are the following:

Framework on Institutional Analysis for IWRM in a River-Basin Context. Already published as IWMI Working Paper No. 5, this volume has been widely distributed to provide guidelines for river-basin studies and strategies for improved river-basin management. The contents of this paper are presented in Final Report, Volume II, along with the Study Inception Report and Methodological Guidelines as its annexes.

Best Practices and Some Lessons for Developing Countries. Three case studies on river basins with advanced stages of development and management (the Murray-Darling river basin, Australia; the Omonogawa river basin, Japan; and the Brantas river basin in Indonesia) have been synthesized and already compiled as Final Report, Volume III of the Study. For wider dissemination, this will be published by IWMI as a Working Paper.

Synthesis of the Multi-Country Regional Study on the Development of Effective Water-Management Institutions. Research findings from five countries, China, Indonesia, Nepal, the Philippines and Sri Lanka, have been synthesized with a view to drawing important generic lessons and generating recommendations for action plans towards achieving improved water-resources management in a river-basin context, and are included in the Final Report, Volume IV. This will be published as an item in the IWMI Research Report series. In addition, each country report will be published as a project Working Paper.

Water-Sector Reform Efforts in Five Asian Countries. Supplementing the information gathered from the seven river-basin studies in six countries, national-level water-sector policy analyses were conducted in five countries (China, Indonesia, Philippines, Sri Lanka and Thailand). These policy reports will be published separately as individual volumes. The five reports and a synthesis have been compiled into the Final Report, Volume V. A synthesis of these reports will also be a separate IWMI publication.

Proceedings of the Malang Workshop (January 2001) on IWRM in a River-Basin Context. This publication has been widely distributed.

Proceedings of the Regional Seminar and Ministerial Roundtable Dialogue. The seminar and roundtable discussions brought together experts from many different countries representing governments, researchers, NGOs and donor organizations. The format of the meetings emphasized active guided discussions rather than formal presentations. The proceedings of the two events are being published as two separate volumes. The two publications detail the process of discussions and the results achieved. The seminar proceedings also highlight the presentations given by the various research teams, and summarize the results from the extensive research undertaken for the two projects.

Methodological Paper: “Multilevel participatory consultative approach for institutional change in river basins: Lessons from Deduru Oya case study in Sri Lanka” is already under publication, as a contribution from the experience of the Sri Lanka study team in its field consultations.

Institutional Development

The study succeeded in promoting IWRM mechanisms in all the participating countries. Its main achievements were in the Philippines, Indonesia and Sri Lanka, as described in section 3 (iv) above.

Chapter 5

Study Reports

The study generated the following project reports during the study period:

1. Inception Report (First Semiannual Progress Report) – 15 June 1999.
2. Proceedings of the Inception Workshop – 30 July 1999.
3. Methodological Guidelines – 1 October 1999.
4. Note on Progress for the ADB Review Mission of 24–26 November 1999.
5. Second Semiannual Progress Report – 31 December 1999.
6. Framework for Institutional Analysis for Water Resources Management in a River Basin Context – 20 July 2000.
7. Third Semiannual Progress Report – 20 July 2000.
8. Three Case Study Reports on Advanced River-Basins – 31 December 2000.
9. Proceedings of the Regional Workshop held in Malang – 1 February 2001.
10. Fourth Semiannual Progress Report - 30 March 2001.
11. Fifth Semiannual Progress Report – 15 July 2001.
12. Report of the Thailand Study – 20 March 2002.
13. Report on Legality of Establishing RBOs in Sri Lanka – 24 March 2002.
14. Sixth Semiannual Progress Report - 25 March 2002.
15. Proceedings of the Final Regional Seminar held in Bangkok – 15 July 2002.
16. Seventh Semiannual Progress Report – 31 July 2002.
17. Excerpts from the Ministerial Roundtable Dialogue held in Bangkok – 30 March 2003.
18. Eighth Semiannual Progress Report – 31 March 2003.
19. Five Reports on Water Sector Policy Analyses – 15 June 2003.
20. Draft Final Report – 30 June 2003.

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