WORKING PAPER 5

A Framework for Institutional Analysis for Water Resources Management in a River Basin Context

D. J. Bandaragoda

International Water Management Institute

IWMI
INTERNATIONAL WATER MANAGEMENT INSTITUTE

FUTURE HARVEST
IWMI is a Future Harvest Center
Supported by the CGIAR

Working Paper 5

A Framework for Institutional Analysis for Water Resources Management in a River Basin Context

D. J. Bandaragoda

International Water Management Institute

IWMI gratefully acknowledges the financial support for its research work from the following Governments, Development Banks, Agencies, and Foundations: Australia, Brazil, Canada, China, Denmark, France, Germany, India, Iran, Japan, Netherlands, Norway, Pakistan, South Africa, Sweden, Switzerland, Taiwan, Turkey, European Union, United Kingdom, and United States of America; African Development Bank (AfDB), Asian Development Bank (ADB), and World Bank; Agricultural Engineering Research Center (AERC), Council of Agriculture (COA), Food and Agriculture Organization of the United Nations (FAO), and International Fund for Agricultural Development (IFAD); Chi-Seng Water Management and Development Foundation, Environment Greening Foundation, Ford Foundation, Taoyan Irrigation Research and Development Foundation, and Tsao-Jiin Memorial Foundation for R&D for Agriculture and Irrigation. The Governments of India, Iran, Mexico, Nepal, Pakistan, Sri Lanka, and Turkey also provided program support for IWMI-related activities in these countries.

The author: D. J. Bandaragoda is Senior Management Specialist, International Water Management Institute (IWMI), Colombo, Sri Lanka.

The author gratefully acknowledges the comments and ideas received from M. Samad, Tushaar Shah, R. Sakthivadivel, and Douglas J. Merrey in the preparation of this Working Paper.

Bandaragoda, D. J. 2000. *A framework for institutional analysis for water resources management in a river basin context.* Working Paper 5. Colombo, Sri Lanka: International Water Management Institute.

/water resources management / river basins / agricultural development / institutions / organizations / institution building / policy / change / China / Indonesia / Nepal / Philippines / Sri Lanka/

ISBN 92-9090-423-2

Please direct inquiries and comments to: *iwmi-research-news@cgiar.org*

Contents

Preface

This document is meant to present a framework for analyzing the institutions related to water management in a river basin context.

The design of the five-country regional study undertaken by IWMI on "Development of Effective Water Management Institutions" provided a new methodology and a framework for river basin studies. It consists of four key components of diagnostic investigations related to water resources management in a river basin, which are interrelated. These key components are the physical system, water accounting, socioeconomic situation and performance. This study design is given in the Study's Inception Report of 15 June 1999, and the Methodological Guidelines of 1 October 1999.

This document takes one step further, and provides a conceptual framework for analyzing the institutional framework for water resources management in a river basin. The major thrust of this framework for institutional analysis is that the four key areas of diagnostic studies in a river basin are shown to be closely linked to the institutional framework for integrated water resources management in the context of a river basin.

Using the river basin as the unit of analysis, this conceptual framework seeks to explore the utility of diagnostic studies to develop an effective institutional framework. The diagnostic studies in the river basin help in linking the analysis both to the physical dimension of the water resource, which is related to its location, type, quantity and quality, and the nonphysical dimension, which is related to its users, stakeholders and their interests, preferences and objectives. In addition, the basin-based diagnostic studies can also link the analysis to the time dimension of the water resource, which is both the historicity and the sustainability related to the use of water in the basin.

Based on the simple, but broad, definition of the term "institutions," which has been chosen for this study on the basis of an extensive literature review, the suggested framework for institutional analysis focuses on evaluating three main pillars of institutions, namely, laws, policies and administration. The institutional environment of human actions is seen as a necessary but not a sufficient condition for management performance. Effectiveness of water management institutions, therefore, is seen in their ability to provide an appropriate and adequate structure to human actions involved in water management, a structure that can be used with least transaction costs.

Finally, the document provides a very brief set of guidelines, supported by an outline of some issues, constraints and prospects of institutional change. Particularly, it promotes the idea of developing a contextually appropriate and adequate institutional framework, essentially through a participatory approach involving all stakeholder groups.

A FRAMEWORK FOR INSTITUTIONAL ANALYSIS FOR WATER RESOURCES MANAGEMENT IN A RIVER BASIN CONTEXT

1. INTRODUCTION

1.1 The Document

This document serves as a framework for institutional analysis to be used in the study on "Development of Effective Water Management Institutions" (objectives of the study are given in section 1.2 below). The document takes into account some critical issues on institutional development, including the persistent gap in performance between developed and developing countries, and the disappointing results of many institutional solutions attempted to reduce that gap. Also, another important question is how, to what extent and under what conditions can the success stories of institutional development be replicated. The main thrust of the document is that, based on the contextual factors and lessons drawn from success stories, a participatory process involving all stakeholder groups to identify locally adaptable institutional strategies is the more viable and productive approach to institutional change.

Following this introductory section, the document includes in its section 2 an outline of some concepts and interpretations of key terms related to institutional analysis, and section 3 deals with some issues and constraints related to institutional change. Section 4 focuses on the concept of integrated river basin management in a river basin context, and section 5 describes how the site-specific activity components of the study are linked with institutional analysis in a river basin context. Finally, section 6 provides some guidelines for undertaking the analysis of institutions with a view to developing institutional strategies for improving the performance of agricultural water management in the context of integrated water resources management.

1.2 Linkage with Study Objectives

The background to this document is a 3-year regional technical assistance study, launched in 1999 by the International Water Management Institute (IWMI), with financial support from the Asian Development Bank. The study is being conducted in collaboration with local research institutes and implementing agencies in five developing member countries (DMCs) of the Bank: People's Republic of China (PRC), Indonesia, Nepal, Philippines and Sri Lanka.

The overall purpose of the study is to improve the management of scarce water supplies for agriculture in the participating DMCs, within and responsive to a framework for integrated water resources management.

The specific objectives of the study are 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 (details of study design and expected outcomes are given in section 4).

The study is implemented in a collaborative mode. The collaborating research institutes and operating agencies in each country play an important role, not only in the successful completion of the study activities, but also in developing increased awareness about the institutional changes that are needed and the lessons from more developed countries that can be applied to solve their institutional problems to achieve improved water management. Within this scope, the study was designed to have five main activities:

- 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 integrated water resources management

- 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

- 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

- 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

- support for implementation of action plans for policy and institutional reform in the participating DMCs

1.3 Further Development

This document, which focuses on the analysis of the institutional framework, is a partial fulfillment of the first of the above-mentioned five tasks. A further elaboration of the contents of this document will be made later to cover the management aspects, taking into account the final outcomes of field studies, which are currently under way. The document, which builds on the "Methodological Guidelines" issued during the study inception stage, is for the benefit of the study groups in conducting the third task mentioned above, i.e., in-depth institutional assessments in the five selected study sites.

2. INSTITUTIONS, ORGANIZATIONS AND MANAGEMENT

2.1 What are "Institutions" and "Organizations"?

Institutions and organizations are part of our daily life, and the two terms are so common in usage that we have taken them for granted without realizing that they could have some distinct meanings. In analyzing institutional arrangements in any context, a clear understanding of the term "institutions" and how it is related to the term "organizations" is critically important, as many different meanings have been given to this term, depending on where, by whom and for what purpose it is used. A clarification of the two terms and their interaction is given below.

2.1.1 Need for Clarification

Even in its most popular usage, the term "institutions" seems to convey a narrow, and therefore not entirely correct, interpretation. In this erroneous interpretation that is commonly used by many, "institutions" are regarded only as "organizations." The connotation becomes much more common in the use of the term "institution building," which most often refers to the building up of new organizations (parastatal bodies, additional units in existing agencies, farmer organizations, river-basin organizations, etc.).

Often, a preoccupation on organizational development tends to neglect the importance of laws and policies that are necessary for effective organizational performance. This lapse seems to account for the limited success so far achieved in establishing appropriately comprehensive and effective institutional mechanisms for improved water management in many situations. Illustrative of this limited achievement are the new organizational units, On-Farm Water Management Directorates in Pakistan and the Irrigation Management Division in Sri Lanka, which did not achieve desired results for lack of matching legal and policy support to integrate them into the existing institutional framework.

The preferred emphasis on organizational structures and the apparent failure of this expansion can be compared to an attempt to build and maintain physical structures without due attention on the relevance of operational rules, maintenance specifications, and regulations for allocation of water. Also, some selective organizational reforms are similar to piecemeal and ad hoc modifications on old buildings with no relation to the conditions and technology under which they were originally constructed.

To avoid developing and installing nominal institutional change, it is necessary to understand the cohesiveness and the functioning of various elements of the existing institutional framework in the contexts under study. It is necessary to distinguish between organizations and their underlying institutions, so that a comprehensive analysis could be undertaken. If there are new performance objectives that relate to changed physical, socioeconomic circumstances, what would be required is a review and reform in both organizational structures and operational rules, evaluated in the context of the wider institutional environment. Initially, therefore, it is useful to clarify the terms "institutions" and "organizations."

2.1.2 "Institutions" Defined

Consider the following list: Caste System, Marriage, Executive Presidency, Contract, The Military, School, Hospital, Trade Union, Labor Laws, The World Bank, Exchange Control, World Trade Organization, General Agreement on Trade and Tariffs (GATT), International Water Management Institute, Mahaweli Authority Act and the Mahaweli (River Basin) Authority of Sri Lanka. One common characteristic of the meanings conveyed by all of these words is that they all serve to shape human interactions. They can all be referred to as institutions, but clearly, only some of them are organizations.

In general sociology, an institution is "an organized, established, procedure" (Jepperson 1991). These procedures are represented as constituent rules of society, or "rules of the game." Primacy of institutions in sociology was seen when Durkheim called sociology the "science of institutions." A commentator on Weber suggested that "the theory of institutions is the sociological counterpart of the theory of competition in economics" (Lachmann 1971:68). The notion that an institution is a social order or pattern that has attained a certain state or property implies that institutions serve the purpose of shaping and stabilizing human actions.

Institutional economics adopts a similar interpretation in which "institutions" are defined as basically "the rules of the game in a society, or more formally, the humanly devised constraints that shape human action" (North 1990:3). The institutions set the ground rules for resource use and establish the incentives, information, and compulsions that guide economic outcomes.

Institutions can be both formal and informal. Apart from written laws, rules and procedures, informally established procedures, norms, practices and patterns of behavior form part of the institutional framework. After years of tradition, informal practices also become "rules" in their own right, when they are accepted by the society. These formal and informal institutions define and fashion the behavioral roles of individuals and groups in a given context of human interaction, aiming at a specified set of objectives. The key characteristics of institutions are that "they are patterns of norms and behaviors which persist because they are valued and useful" (Merrey 1993).

In many developing societies, informal rules have a tendency to override formal rules, making the enforcement of formal rules very difficult and thereby affecting performance (Bandaragoda and Firdousi 1992). While the coexistence of formal and informal institutions is inevitable, situations where some informal rules tend to contradict formal rules are obviously dysfunctional. Also, it is possible that, due to lack of proper enforcement or due to disregard towards the spirit of the written laws, they become ineffective, and are replaced by a set of practices that show a divergence from the declared laws, rules and regulations. These practices can be referred to as "rules-in-use" (see section 5.1).

The emphasis on rules of human conduct in the definition given to "institutions" finds an analogy in the set of rules and conventions governing any competitive sport, such as a game of football. Basically the rules give a structure to the game and provide a basis as to how the game should be played. The rules also include provisions for rule enforcement including penalties or sanctions for violations, and sometimes, rewards for compliance. The rules also specify the layout of the playground, the positions of various players, and the structure of the team. In this sense, the

"institutions" cover both the organization of the team of players and how they should play the game.

Based on the definitions given above and the terminology used in practice, the institutions are a combination of:

- policies and objectives
- laws, rules and regulations
- organizations, their bylaws and core values
- operational plans and procedures
- incentive mechanisms
- accountability mechanisms
- norms, traditions, practices and customs

2.1.3 "Organizations" Defined

Organizations are defined as "networks of behavioral roles arranged into hierarchies to elicit desired individual behavior and coordinated actions obeying a certain system of rules and procedures" (Cernea 1987). A similar definition describes organizations as "structures of recognized and accepted roles" (Merrey 1993:8). This hierarchical arrangement is popularly referred to as the "organizational structure." Organizations are groups of individuals with defined roles and bound by some common purpose and some rules and procedures to achieve set objectives. Like institutions, organizations also shape human action.

North (1990:73) defines organizations as "purposive entities designed by their creators to maximize wealth, income, or other objectives defined by the opportunities afforded by the institutional structure of the society." An example is the Mahaweli Authority of Sri Lanka (MASL), which was created by the new government that came to power in 1977. The purpose was to harness water and land resources in the Mahaweli river basin for the much needed food production and employment generation, two strong political objectives at that time. As its value and usefulness grew in the society, MASL gained acceptance and became an established organization.

For the purpose of our study, institutional analysis at this stage will focus on both the underlying rule systems and the organizations as agents of institutional change.[1] A broad interpretation of the institutional framework as given in section 2.4 below will be the chosen approach for this purpose, which will facilitate this needed focus. To be able to focus on the suggested emphasis on institutional analysis, an important conceptual consideration is the interaction between institutions and organizations, a brief outline of which is presented below.

[1]A thorough organizational analysis to cover various water management agencies such as irrigation departments is beyond the scope of this framework. Such a task would involve an analysis of leadership, motivation among organizational members, their knowledge, skills and capacities and their value systems and preferences. Most of these aspects are directly related to management functions, which can be addressed when action plans are considered by various stakeholder groups.

2.2 Interaction between Institutions and Organizations

2.2.1 Two Perceptions

The link between institutions and organizations can be seen in two ways.

One way is to perceive that how organizations come into existence and how they evolve are fundamentally influenced by the institutional framework. For instance, the creation of irrigation departments in many countries followed the enunciation of water-related policy, and the enactment of irrigation ordinances. Similarly, international agreements have given rise to multilateral organizations such as the UN or the World Bank. Thus, the two components, institutions and organizations are intrinsically interlinked, and together, they provide a structure for human interactions. Once established, the organizations, in turn, influence how the institutional framework develops. For instance, the irrigation departments or other water-related organizations sometimes try to assess changing social, economic, and more importantly, political situations and adjust the institutional framework to suit the emerging demands. Similarly, since the inception of the UN and the World Bank, they have proceeded to expand the institutional framework for the international order.

The second perception of this link is that established organizations, which represent a set of norms and behaviors that persists because they are valued and accepted as useful, are in fact institutions. irrigation departments, water boards and well-established river-basin organizations, such as MASL, are examples. An ad-hoc committee formed for a temporary task is not an institution. Nor is a water user association formed by government officials for limited purposes during the construction phase of a project. A water user association persisting over time and continuing to fill a need that is valued and useful to its members can be seen as an institution, or an “institutionalized” organization (Merrey 1993:9).

Either of these perceptions has one important consideration for our study, namely, the need to consider the compatibility between existing laws, customs, policies and organizational arrangements. Also, the value and usefulness of the existing institutional framework as accepted by the stakeholder community need to be evaluated. Changes necessary for the institutional framework can be formulated only on that basis.

According to both of these perceptions, some established organizations, which are part of the water-related institutional framework can be seen as agents of institutional change. This is a very important consideration in terms of our study. It may be possible to identify the extent to which these organizations have played a role in fashioning the existing institutional framework.

Also, both in conducting an institutional analysis and in formulating recommendations for change, the support of such influential organizations can be very useful. More importantly, the real value of these organizations will be during implementation of identified institutional strategies.

2.2.2 Functions of Institutions

The definitions given above highlight that the institutions are humanly devised "constraints" to shape human action. However, the institutions inherently have dual facilities to both constrain and liberate individual and group action (Bromley 1987). A good example is how the laws and the courts system restrict some human actions, and also provide freedom for action in some other instances. Like in the football analogy mentioned earlier, some laws restrict antisocial actions, and some others enable productive actions and protect the innocent citizens.

The dual facilities of institutions are of particular importance in water management. Most water-related rules are meant to constrain the socially undesirable behavior by individuals and groups in the distribution and use of water. Basically, water allocation rules serve this purpose. Some water-related institutions, such as those governing water user associations, are designed to promote organized behavior and equity and provide various opportunities for individual and group advancement, thereby serving to liberate human action.

The institutional framework serves to reduce the uncertainty of human actions, and thereby they have a stabilizing effect on society. For example, established water allocation rules tend to bring about equitable distribution of water, provided that these rules are applied along with other related rules and norms, such as mechanisms to monitor water-delivery systems and laws relating to violation of commonly accepted allocation practices.

Centrally imposed or externally mandated institutions are particularly meant to bring about stability. Stabilizing effects of institutions can be seen in such instances. For example, many multilateral institutions such as the United Nations (UN) and World Trade Organization (WTO) build on, homogenize and reproduce standard expectations worldwide, thereby stabilizing international order.

2.2.3 Role of Organizations in Effecting Change

The stabilizing effect of institutions mentioned in section 2.2.2 does not mean that institutions themselves are not subject to change. As society and its priorities change, institutions (conventions, codes of conduct, norms of behavior, laws, contracts) seem to evolve and continually alter the choices available to the individual.

The cyclic phenomenon related to institutions, in which institutions are primarily determined by human action, which once established, in turn, determine the scope and character of subsequent human action for desired objectives, is an important consideration in analyzing institutions for possible change. Particularly, the behavioral roles in an organization can surface the need for changes. The analysis should be able to assess whether this need exists, whether it has already been identified, and how an external facilitating role can be useful to identify and introduce change.

For instance, existing laws and procedures for sharing of water resources among the different users in a river basin may not be adequate in terms of present circumstances. The extent and the character of an observed gap between declared rules and rules-in-use will, together, be a good indicator for institutional change.

An irrigation department established on the basis of an original set of procedures and rules, and the behavior of water users whom it serves, may demonstrate the need for institutional change. Usually, established organizations and their key members sometimes take the initiative to change the existing institutions on the basis of identified needs, often based on their own interests. This is an important consideration in formulating change.

2.3 Institutions and Management Performance

The linkage between institutions and performance is indisputable. But, how institutions contribute to, or affect, performance is important to identify and assess the needs for institutional change depending on the current levels of performance.

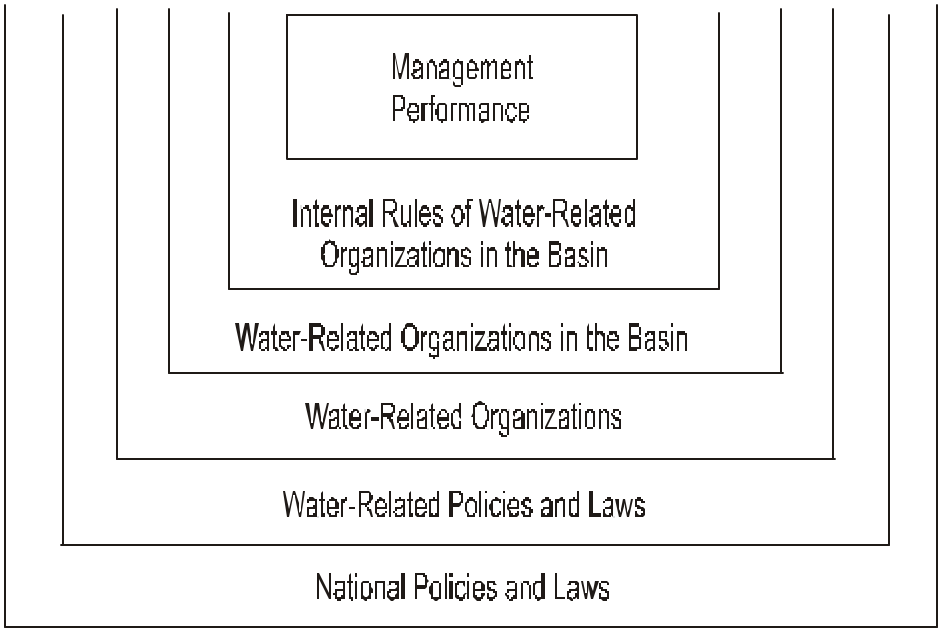
At the outset, it is useful to note that "institutional performance" is a misnomer. Institutions being rules and role structures, practices and norms, do not perform, or effect any performance as such. On the basis of the strength and validity of institutions, it is the management or the people in an organization that actually effect performance and hence is the emphasis of our subtitle above, "institutions and management performance."

From an economist's viewpoint, basically, institutions affect the performance of an individual, group or organization, a country or its economy, through the effect of institutions on the costs of exchange and production. Together with technology, the institutions determine the transaction and transformation (production) costs (North 1990). Therefore, in a comparative evaluation of two different sets of institutions, performance can be expected to be better in the institutional framework, in which these transaction costs are less.

In institutional analysis, there is an essential need to conceptually differentiate the rules from the players in an organization (North 1990:4). In the football analogy, while the rules define the way the game has to be played, the objective of the team of players is basically to act according to the rules and win the game. Similarly, the members of an organization have some defined objectives, and they endeavor to achieve them by being within the institutional framework, and by using a combination of extra-institutional factors, such as knowledge, skills, strategies and coordination. These factors are related to management functions, which account for performance to a larger extent than the institutions. The institutional framework serves as a necessary condition, but not as a sufficient condition for management performance. A succinct definition by North (1990:4) aptly refers to institutions as the "framework within which human interaction takes place."

Human actions are constrained and protected by a nested system of different layers of institutions. How management performance is circumscribed by this nested set of institutions is illustrated in figure 1.

Figure 1. Nested institutions and management performance.



2.4 A Broad Definition of Institutions for This Study

Based on the discussion in the foregoing, and considering both the core meaning of the term "institutions" which emphasizes on the rules aspect and the emphasis in popular usage of the term associated with "organizations," we may use a broad interpretation as given in box 1 for the purpose of our current study. This interpretation covers all three important elements in the institutional framework, namely policies, laws and organizations, and is similar to that adopted by Saleth and Dinar (1999a and 1999b). It is particularly chosen for the study, because it is more easily amenable to institutional analysis aimed at performance improvement.

Box 1. Interpretation of "institutions" adapted for the study.

Based on the above-mentioned concepts and definitions, the interpretation that is suggested to be adapted for the purpose of this study is given below.

The institutional framework for water resources management in a river basin context consists of established rules, norms, practices and organizations that provide a structure to human actions related to water management. Notably, the established organizations are to be considered here as a subset of institutions. For practical purposes, the overall institutional framework is considered in three broad categories: policies, laws and administration, all of which are related in some way to water resources management in a river-basin context.

Policies: *National policies*
Local government policies
Organizational policies

Laws: *Formal laws, rules and procedures*
Informal rules, norms and practices
Internal rules of organizations

Administration: Organizations at policy level for resources management
Organizations at implementation level for delivery management

3. INTEGRATED WATER RESOURCES MANAGEMENT IN A RIVER BASIN CONTEXT

3.1 Integrated Water Resources Management

Essentially, the concept of integrated water resources management needs to be linked to the principles enunciated by the Dublin Conference on Water and the Environment (ICWE 1992) and the famous Agenda 21 of the Earth Summit in Rio de Janeiro (UNCED 1992). The main principles and concepts are given in box 2.

Box 2. Dublin principles and key concepts.

Principles

? *Water is a finite, vulnerable and essential resource, which should be managed in an integrated manner.*

? *Water resources development and management should be based on a participatory approach, involving all relevant stakeholders.*

? *Women play a central role in the provision, management and safeguarding of water.*

? *Water has an economic value and should be recognized as an economic good, taking into account affordability and equity criteria.*

Key Concepts

? *Integrated water resources management, implying an inter-sectoral approach, representation of all stakeholders, all physical aspects of water resources, and sustainability and environmental considerations.*

? *Sustainable development, which is sound socioeconomic development that safeguards the resource base for future generations.*

? *Emphasis on demand-driven and demand-oriented approaches.*

? *Decision making at the lowest possible level.*

Source: Savenije and van der Zaag 1998.

3.2 River Basin as Unit of Analysis

With the recognition of significant reuse of water, the river basin is increasingly acknowledged as the appropriate unit for the analysis and management of water resources, especially as water availability at the basin level becomes the primary constraint to agriculture. The growing scarcity of good quality water in most river basins results in intense inter-sectoral competition for water. The efficiency of irrigation water use can be seen in a more comprehensive manner, if the allocation of water in a basin among various users is considered along with irrigation use. Similarly, a more comprehensive analysis requires the study of the adverse effects of a rapid degradation of the environment and other ecological problems arising from severe competition for water along with the irrigation-induced environmental problems.

The neglect of such a wider consideration of the resource base has up to now clouded the inherent limitations of existing institutional arrangements to deal with irrigation systems. As countries experience growing water scarcity, water-sector institutions need to be reoriented to cater to the needs of changing supply-demand and quality-quantity relationships and the emerging realities (Saleth and Dinar 1999a). It is inevitable that the irrigated agriculture sector, the largest water user in many river basins, will be called upon to reassess its water requirements in view of the competition of water from other users.

Difficulties imposed by policy and institutional constraints at levels above farms and irrigation systems are attributable to the failure in realizing the full benefits from many reforms that have been attempted in irrigation management. There is now wide acceptance of the necessity to focus on higher-level institutions, generally at the basin level. In Asia, this view was reinforced at regional conferences sponsored by the Asian Development Bank in 1996 (see Arriens et al. 1996).

A basin-level analysis also helps in distinguishing between two important aspects of management: resource management at the macro level, and the service delivery management at the system level. The institutional arrangements for these two aspects of management normally have distinct emphases, and the two sets of functions need to be compatible with each other for optimum level of water use efficiency and productivity.

In terms of institutional change, a basin perspective may bring about the much-needed balance between the need for decentralization and the continued responsibilities of the center. The recent trend has been to focus at the system and farm levels, and look for institutional changes at that level such as water user associations to which part of the system management responsibility was to be transferred. This trend tends to ignore some important areas of management concerns related to the safety of dams, flood control, drought planning, ground water depletion and environmental regulations (Perry 1999:49).

In a river basin, there can be a number of issues and problems whose solution can bring common benefit through good governance, efficient and sustainable resource use and environmental protection and security. These shared concerns can lead to “Communities of Common Concerns,” or organized community groups in the basin area. For such groups to become established, one important requirement is an enabling legal environment and a friendly support policy and the law enforcement authorities.

In a genuinely participatory approach, outsiders can play only a facilitating role. Helping the people to help themselves and reach a reasonable degree of stability and strength in community participation is very often a time-consuming process. Their effective participation in resources management, however, depends on the degree of their awareness of important technical considerations.

Some of the ideas expressed in the Study Inception Report (15 June 1999), which explained the validity of a river-basin perspective, are used here for recapitulation. Besides, they can now be better interpreted in terms of study outcomes realized so far.

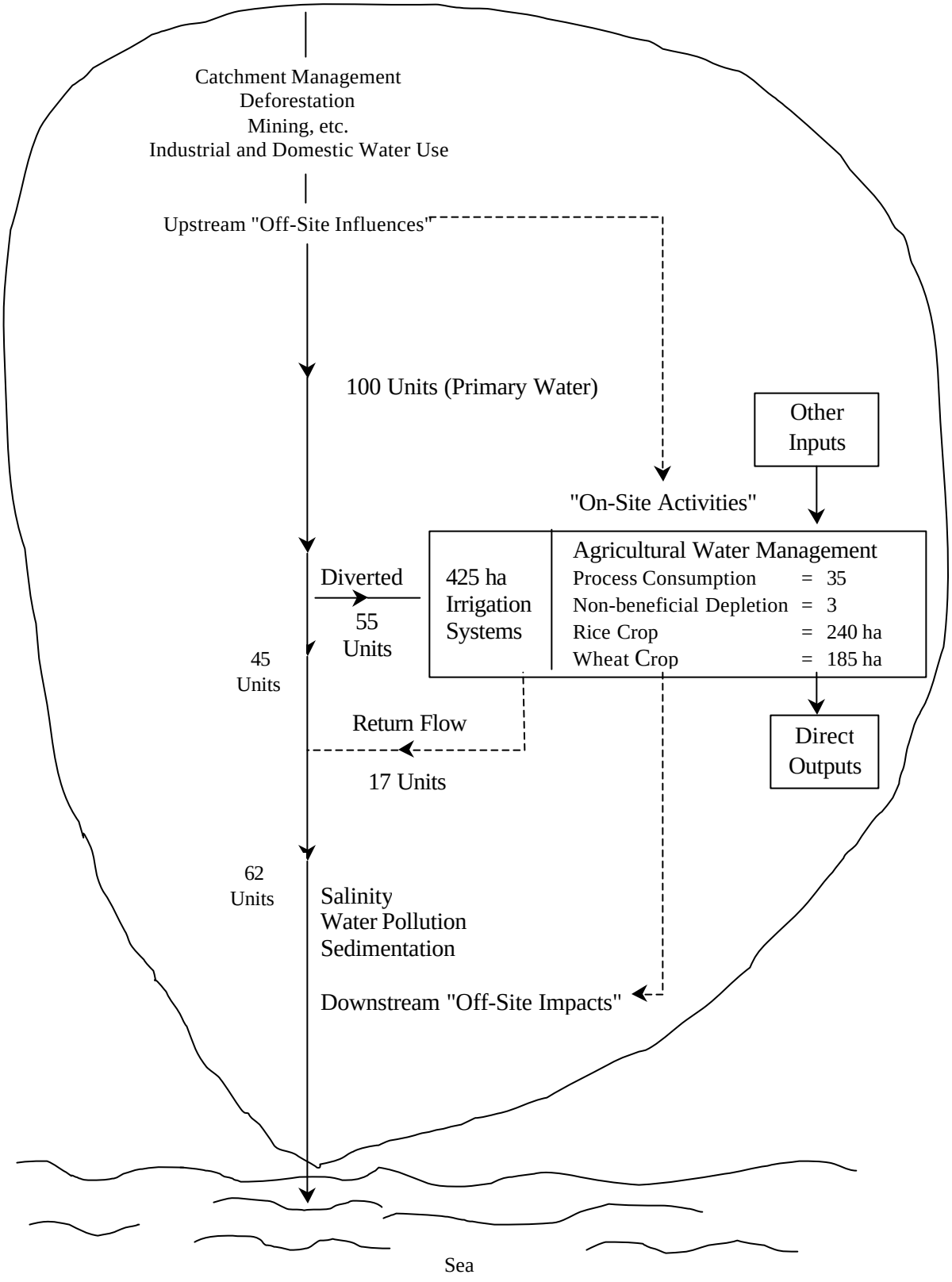
3.3 On-Site Gains and Off-Site Implications

The river basin as the geographical unit in which analyses are conducted defines an area where various users of the basin's water interact, and where most of them live. A basin perspective helps to include in the analysis the interactions among various types of water uses and water users, and in the process, it helps in better understanding the physical, environmental, social and economic influences that impinge on the productivity of agricultural water management.

In a basin context, interrelated issues on both quantity and quality of surface water and groundwater, and the extraction, use and disposal of water resources can be more comprehensively analyzed. The participation of a larger number of stakeholders can be sought, and water resources planning can be more effectively carried out. The broader view through a river basin is able to capture dimensions, which are not normally included in an irrigation-system management approach, such as the causes (and not only the effects) of water scarcity, water quality, water-related disputes, and inequitable water distribution and use.

An integrated approach to water resources management in a river basin would enhance both productivity and sustainability of natural resource use. Sustainability means that the concerns on resource use should transcend beyond short term "on-site" gains, and should necessarily be on an environmentally sensitive use of resources including many possible "off-site" implications. The off-site influences on a water use system, as well as the off-site impacts arising from a water use system, can both be systematically studied identify the factors that affect the performance of the water use system. Figure 2 shows the linkages between these three water-related behavioral patterns in an oversimplified river basin having a single water use system.

Figure 2. Schematic representation of a river-basin perspective.



In some of the river basin sites of this study, the complexity inherent in physical and social relationships within a basin has already been surfaced. Development and management practices of a single water use, a single segment of the community, or a single sector take place without much reference to the needs and demands of other uses, people and sectors. Upstream power companies tend to act independently with little regard to downstream agricultural water users; deforestation in the catchment area of a storage facility disrupts the smooth operation of the facility; head-end users take more water than necessary, thereby affecting tail-end users in a river system.

Lack of understanding of the interdependencies of various human interventions within a river basin results in inefficient use of resources, economic losses and environmental degradation.

3.4 Four Key Elements of the River-Basin Perspective

There are some key elements of the river basin approach that may be commonly applicable to all basin locations. Four such key elements, as reflected in the Murray-Darling River Basin model (Arriens et al. 1996:107) are mentioned below.

3.4.1 Appropriate Institutional Arrangements

Multiple groups manage and use water resources. Left to themselves, each group tends to give priority to its own needs as coordinating mechanisms do not often exist in a sectoral treatment of water. Consideration of all users and uses within a river basin facilitates the introduction of such inter-sectoral coordination. Additionally, the stakeholders may collectively derive some synergic benefit from being able to integrate their administrative efforts.

To derive some significant benefits from an integrated administrative effort, acceptable forms of institutional arrangements (rules and roles) should be in place. The expected behavior by the various stakeholders should be reflected in well-defined rights and responsibilities, as well as in policies, laws and administrative structures and procedures. The stakeholders should be structured through effective organizational and procedural arrangements so that each stakeholder group is aware of its own (and others') rights and responsibilities. The main objective should be to coordinate effective planning and implementation of equitable, efficient and sustainable use of natural resources in the basin with a view to improving the sustainability of its agricultural development.

3.4.2 Reliable Information Base

For effective coordination and institutional performance, water resources management within the basin must be essentially knowledge-driven. As the physical and social characteristics of a river basin system are less conspicuous than in a more visible irrigation system, an effective management effort in a river basin should necessarily rely on a sound database about the physical,

social, environmental, economic and institutional parameters of the basin. The different actors and different sectors using land and water resources within the basin should be able to understand and assess the requirements of one another, as well as the limitations imposed on each of them by the overall environmental considerations.

In more practical terms, a basin approach to water resources planning, particularly aimed at assessing the influences on agricultural water management, needs to be based on a number of key sets of information related to the basin, which the study components seek to gather: present conditions of the physical subsystem, availability of water and its quality, analysis of its social subsystem including who uses water for what purposes, how the uses and users have been organized and their binding rules, and current performance levels of the production systems.

3.4.3 Integrated Natural Resources Management in the Basin

In a river basin, a large number of individuals and groups are involved in using land, water and environmental resources for different sectoral purposes. A basin approach in water resources management helps to achieve an optimum level of integration among these various uses of different natural resources. This integration encompasses a coordinated set of policies, rules and regulations covering all natural resources within the basin, and also an effective coordination among the organizations related to the management of all natural resources. For example, the land laws should be in keeping with the laws related to the use of surface water and groundwater, and the laws for environmental protection. A classic case which highlights this particular need for an integrated approach in natural resources management is the traditional rivalry that often exists between agriculture and irrigation functionaries, or between the power and agricultural sectors in developing countries. A basin approach to natural resources management facilitates a concerted effort in coordinating the resources use patterns within a river basin.

3.4.4 Strong Community Participation

Much more than in a single-objective irrigation system, the multiple water users with multiple-objectives in a river basin require a high degree of coordination in their efforts. The need for greater coordination calls for greater participation in resources management from all of the water users.

Issues related to local natural resources can usually be identified clearly and more easily by the local community. A long-term association with the basin environment enables local people to gain a very intimate knowledge about the natural phenomena and the related constraints on resources use. Effective community participation leads to an adjustment in the existing power relationships both within and outside the community. Participation brings about empowerment of the people, enabling them to take their own decisions in an agreed framework of rules.

3.5 Why Focus on Institutional Framework in a River Basin Study?

To develop strategies for improving agricultural water management, the traditional approach would be to study the irrigation agencies and water management practices. This study not only evaluates other factors relevant to a river basin, but also specifically focuses on water management institutions in a river basin context.

Institutions basically serve as instruments for human cooperation and for reducing uncertainty by establishing a stable structure to human interaction (North 1990). In this sense, the study of institutions related to river basin management is of special significance, as the most critical element of integrated water resources management in a river basin is the need for coordination among various human efforts to use the water available within the basin. Therefore, the most fundamental aspect of institutional analysis in the context of river basins is to explore this coordinating role of institutions.

3.5.1 Facilitates Conflict Resolution

In many river basin contexts, conflicts related to water allocation and management exist among geographical units within the basin, among different water use sectors, and among water users themselves within and outside each sector. A significant contribution of a basin-wide organizational mechanism can be towards resolving such conflicts.

A critical constraint against effective river basin management is the commonly prevalent conflict between boundaries of river basins and those of political units. In many instances, the boundary of the political or administrative unit (such as the Nation, Province or District) is the river course itself, whereas in some rare instances, it falls on the mountain ridge. In some other instances, the boundary of the Country, Province or District is a man-made demarcation such as a highway or a fence. In whatever form, when the difference in the boundaries creates a conflict in decision making, invariably the greater emphasis is on the administrative or political boundary. In such instances, a higher-level coordination mechanism is essential, although the effect can sometimes be just nominal, as in the case of the Indus basin (covering a number of provinces within Pakistan), or the Mekong basin (covering a number of nation states). In contrast, a basin that falls within one administrative unit (e.g., Brantas in East Java, Indonesia) has a greater potential for a smoother functioning basin management organization.

Boundary conflicts affecting river basin management can get accentuated when they occur in countries involved in political reforms with devolution of power to lower-level units. If the unit of devolution is the district, bypassing the higher-level province, as it may happen in Indonesia, river basin management is likely to get more complicated due to more complex boundary problems. In such instances, greater care needs to be taken in designing coordination mechanisms.

Although the river basins selected for this study do not involve sharing of water by a number of different nation states, they do cover a number administrative units. Therefore, it is useful to see the parallel between transnational river basin institutions and the mechanisms developed for local-level sharing of water in a river basin falling entirely within one country. As the Dublin

Report stated, the institutional arrangements for both should be based on the same principles (ICWE 1992:40). With the current global trend towards devolution of power to smaller communities, new political units are increasingly being created. As a result, the number of river basins that need to be shared by two or more political units is increasing. Almost 40 percent of the world's population live in river basins shared by two or more countries (World Water Council 2000: v). The percentage of population living in river basins shared by two or more subnational political units should be much more. Therefore, the need and the potential to establish viable and acceptable institutional mechanisms for shared management of water resources in river basins are vitally important.

3.5.2 Addresses Environmental Concerns

A study of institutions related to the basin would also help in understanding the extent to which water resources management in the basin takes into account the environmental effects of development. Adverse environmental effects go beyond the boundaries of water use sectors and geographical units in the basin. Sectoral institutions usually restrict their attention on their own requirements, and similarly different administrative units usually look after their own interests. The degree of coordination among sectors and geographical units reflects on how much environmental concerns are taken into account in the development and management of the river basin. Therefore, one important strategy towards improving environmental protection is to focus on basin-wide institutional mechanisms.

3.5.3 Corresponds to Historical Development

Every drop of water in a river is "liquid history." It traces the path and the process of acquisition, storage, conveyance and use of water within the river basin. Many such drops would have flowed in a river for time immemorial. Therefore, how the basin itself has developed in terms of technological and economic advancement would correspond to the institutional framework that has developed over time in a basin. An understanding of the overall development process would help in assessing how, and to what extent, the institutions have played a coordinating role to promote human cooperation in various water-related activities within the basin.

As institutional development corresponds to historical water resources development in the basin, institutional change tends to reflect the way in which the society and its technology have evolved through time, and therefore, by studying the historical development of a particular river basin we may explore the extent of institutional change that has taken place over time. If the institutional change has been lagging, this may indicate the potential for further change that may be possible and necessary in view of the changes that have occurred in the socioeconomic and technical environment of the basin. For this purpose, at least a short historical sketch of basin development in each study site has been recommended to understand who did what, and for what purpose.

3.6 Institutional Environment of a River Basin

Five main external factors can be identified as either constraints or enabling situations that affect the water management institutions in a river basin. The overall political system, national economic policies, legal framework, socioeconomic environment and the physical resource base are these external influences.

For instance, the overall national policies play a significant role in fashioning the institutional framework for any given social context. Box 3 relates a story on how a broad policy could affect a simple rule related to water management. It also shows how it tends to be circumvented by other economic policies in the same country.

Box 3. Effect of Overall Policy Environment.

Before Energy Policy Act of 1992, most toilets used 3.5 gallons of water per flush. After 1994, when regulations were first enforced, toilets were limited to 1.6 gallons per flush.

Comparing total water use:
Homes with 3.5-gallon-flush toilets used 20 gallons for the toilet, and 73 gallons daily.
Homes with 1.6-gallon-flush toilets used 10 gallons for the toilet, and 50 gallons daily.

Although US law prohibits the production of toilets that use more than 1.6 gallons of water per flush, there is a loophole. American manufacturers can still make high-flush toilets for sale outside the USA. Americans legally buy and import them!

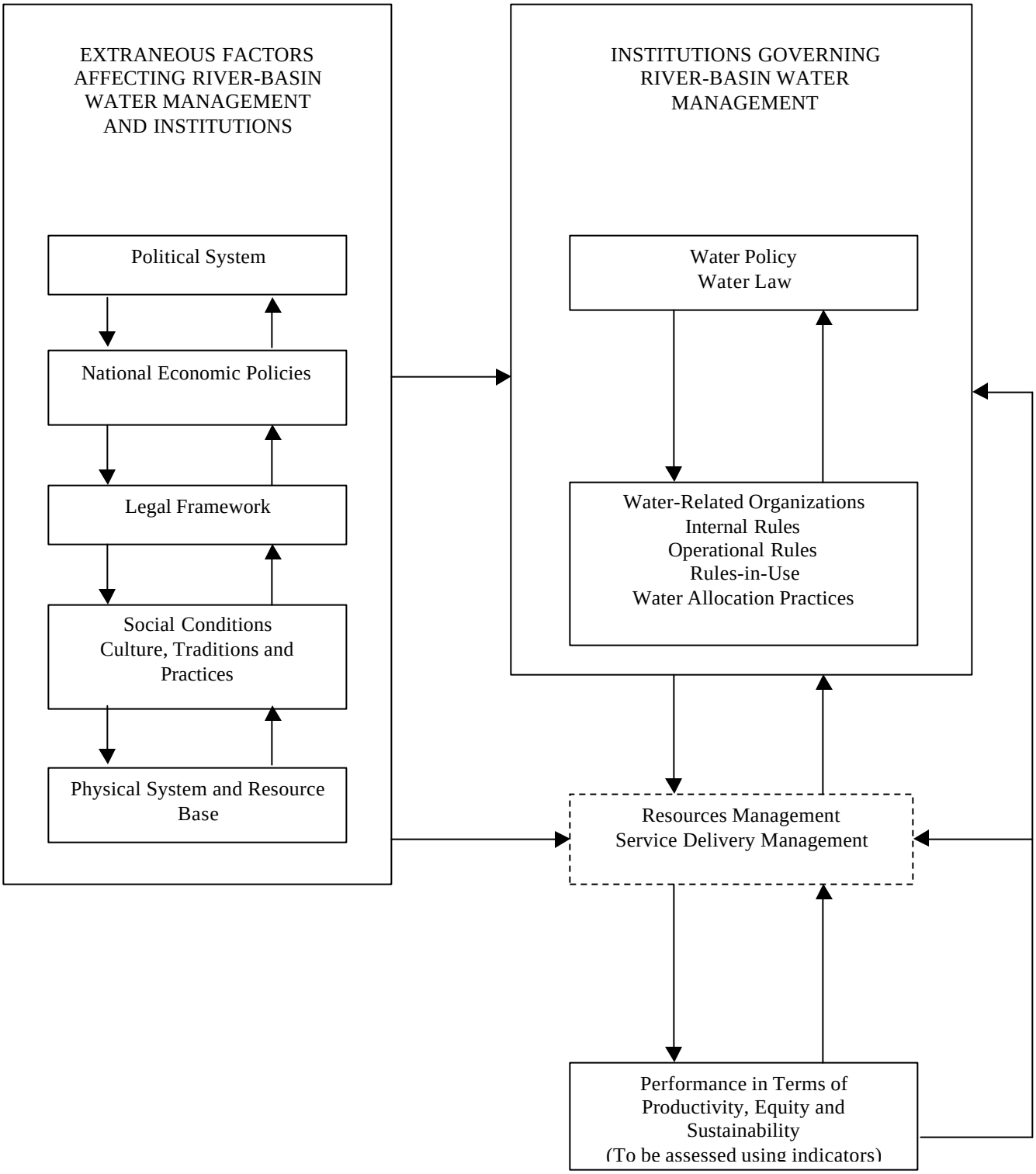
Source: Research by Hillary Wasson, reported in USA Today of 2 June 2000.

Similarly, the overall legal framework and the general "law and order" situation in a country, particularly the social conditions that determine how the laws and rules are applied and adjudicated have a significant effect on water management institutions.

In some instances, the culture, traditions and practices inhibit the effective functioning of water management institutions, whereas, in some other instances, they tend to promote them. In order to assess the actual impact of these external influences, it is useful to have an understanding about the social conditions, traditions and practices in the given context.

Figure 3 shows the conceptual framework underlying the water-related institutions in a river basin.

Figure 3. Institutional environment of a river basin.



4. STUDY COMPONENTS LEADING TO INSTITUTIONAL ANALYSIS

4.1 Study Design for Institutional Assessment

As highlighted in section 1.2, the main objective of country-based studies is basically twofold. First, the field studies in the five countries are expected to identify the relationships between physical and socioeconomic characteristics of selected river basins[2] and their existing institutional arrangements. Second, based on this diagnostic information, possible institutional changes are to be identified for improving the management of water available for agriculture in the context of integrated water resources management in river basins.

In the Methodological Guidelines, six key research questions were mentioned as relevant in a search for appropriate institutional strategies in given contexts:

- What is the hydrological resource endowment of the river basin?

- Who are the present users of water, and what are the present patterns of water use differentiated by sector, public and private uses, gender, and income level?

- What are the formal and informal institutional arrangements for sharing water between uses within the basin and what provisions (or potential) exist for satisfying the unmet water needs of disadvantaged groups, such as women, children and the poor?

- How do the present formal and informal arrangements for allocating and managing water between uses affect equity and productivity of agricultural water use within the river basin?

- What is the nature of conflicts between uses and the means for conflict resolution within the basin?

- What can we say about the future trends and scenarios, with special reference to the future of irrigated agriculture and access to water resources by poor women and men?

Considering the river basin as the unit of analysis places the emphasis of research at a plane higher than that of the traditional irrigation system management focus and facilitates the concerns to shift towards overall water policy and integrated water resources management. This ideological

[2]Although a river basin is typically defined as the entire geographical area from which water drains to the point at which the river flows to a sink (i.e., the sea), for purposes of this study, this definition was adapted to mean the entirety of such a river basin or a part of a basin (subbasin) defined by the location of its stakeholders who have an interest in one or more particular water management problems and who have the ability to address them.

stance helps to capture the effects of growing inter-sectoral competition for increasingly scarce water resources.

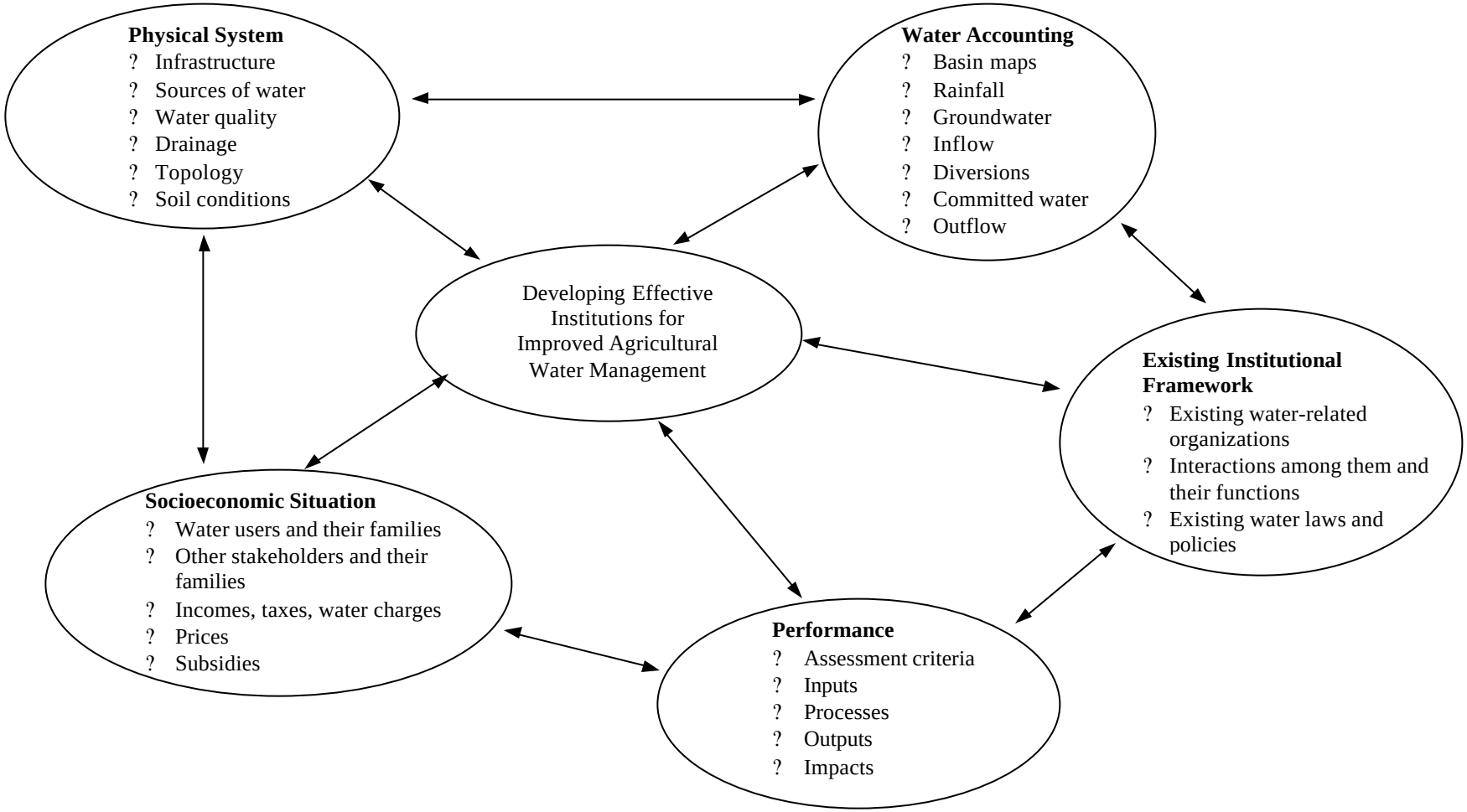
The country studies aim to assess the degree of their temporal and spatial scarcity of water and competition from all the water use sectors, and actively participate in finding solutions to improve agricultural water management. The study design also enables the important research and policy considerations on water quality, resource depletion and degradation and the environment.

The collaborative study activities in the five selected countries are aimed at improving the management of their scarce water supplies for sustainable agriculture, within the constraints of competition for water by other sectors and water-use-related environmental problems. The physical and social diagnostic analyses will help in evaluating the existing institutional framework, as well as in formulating institutional change. The diagnostic analysis on the performance of irrigated agriculture will help the development and initiation of appropriate action plans to address the identified constraints against agricultural water management.

The five countries are in varying degrees of water resources development and related institutional development. They are also at different levels of water management performance. The country studies will identify the distinct features in each of the selected water basins in the five countries, and assess the issues and constraints in the context of their respective national and regional water policies. The studies in the five countries will also add to the institutional reform processes already launched in some of these countries, and will provide an impetus for reform in the others. The studies will also contribute to the Asian Development Bank's initiatives in promoting national water policies.

Although the five study components are separate activities, they are all related to socioeconomic relationships of the stakeholders associated with the basin's water resources. To this extent, the components are interrelated and, in turn, are linked to the final study goal of improving the productivity of agricultural water management in the basin (see figure 4). The usefulness of studying contextual factors in each selected river basin for a final institutional analysis is further explained in sections 4.2–4.5.

Figure 4. Study components aimed at developing institutions for improved agricultural water management in a river-basin context.



4.2 Physical System and Institutions

Presenting a river-basin perspective for water development, G. F. White has once noted that "if there is any conclusion that springs from a comparative study of river systems, it is that no two are the same" (White 1957).

The topology, soil conditions, climate and rainfall, geographical location and natural vegetation all combine to distinguish one river basin from another. Closely related to these natural features are the man-made infrastructure for harnessing water resources from the river system to develop natural resources within the basin. In addition to the natural features of the basin, the characteristics of infrastructure, such as size and scale, technology, and purpose tend to determine the type and character of institutions established for water resources management. In effect, the physical system of the river basin mirrors the institutional arrangements.

A good illustration of this relationship is the canal irrigation system in the Indus basin and its institutional arrangement for water management. The flat terrain of the basin makes storage difficult and requires that the system is a run-of-river diversion in a contiguous canal system. At the tertiary level, there is continuous water flow along the watercourses and the structure at the head of the watercourse is so designed to allow for automatic proportional distribution of water into the watercourses. This physical system is matched by a water allocation system in the form of a rotation based on time-turn, popularly known as *warabandi*, which is self-policing and meant to share water scarcity equally among all the water users in the watercourse command area. Basically, the system is geared for minimum management and control, which also reflects the need to cater to a system of very long canals and a vast command area. Also, it reflects the social and economic characteristics of the water user community.

4.3 Water Accounting and Institutional Analysis

If a river basin is defined as the entire geographical area from which water drains to the point at which the river flows to a sink (lake or sea) then the amount of water in a given river basin in typical years should be a constant. The only exception would be if there are man-made facilities for interbasin transfers of water. Historically therefore, the variable phenomenon within a river basin is the water use through human interventions. As mentioned earlier, as the population increases, and as the technology and social behavior change over time, the pattern of water use also changes. The main purpose of the water accounting activity is to assess this pattern of water use at a given point of time, and over a period of time. Water accounting is something more than calculating a water balance. To put it simply, it is accounting for water resources in the river basin, to understand how much water is approximately received by the basin, and how, how much and for what purposes this amount of water is used. The proportion of water that is (purposively) used for beneficial purposes directly corresponds to the intensity and efficacy of water management institutions, and the nature of this water use corresponds to the character and quality of the institutions.

4.4 Socioeconomic Situation and Institutions

As the population increases, interregional migration and rate of urbanization also tend to increase. In a consumer-oriented society, competitive demands for water for various purposes in a river basin (industries, drinking and domestic, and environmental protection) gradually increase. These increased demands are bound to clash with the traditional interests of agricultural water use, and related institutions. The process of urbanization and modernization (development) accompanies new technologies and they, in turn, cause social change. Together, these socio-technical changes call for changes in the existing institutions.

A good example is how the traditional water allocation principle of "prior appropriation," as in Colorado State in USA (Moore, Phillips and Powers 1994), has been threatened by the new demands for water, accompanied by some technical innovations. Remote data collection through telemetry networks and automated control systems provide managers with "real-time" information about water supply and demand and help them to fine-tune their methods of using water efficiently. As part of this technological advancement, "demand-tailored" water deliveries are possible, and the result is a tendency towards developing new agreements to reapportion surplus water. At the same time, other nontraditional water uses, such as power, municipal and industrial supply, flood control, navigation, fish and wildlife, and recreational purposes press for their water rights through various lobbies and legal instruments. State laws are supplemented by Federal laws and Supreme Court decisions. For instance, the preservation of minimum streamflows is now part of the "public trust" doctrine of USA. The term, "beneficial use" is being defined as "greatest good for the greatest number." Another strange form of flexibility is emerging as a result of "parallelism and conflicts in laws." The point is that a change from the traditional "first user–first right" to a new institutional framework is now possible because of innovative technological support to use water more efficiently, and the accompanying changes in social attitudes towards sharing of water.

The lesson that can be learnt from this experience is that there is a need to understand in any context the changes (or the potential for change) in terms of the technology of water management and the related social change that may have occurred in the recent past. This understanding will help in determining the extent of change that can be incorporated into the existing institutional framework for water management.

Experience in the Omonogawa river basin in Japan provides another example of how new technology has combined with the existing institutional framework to solve a recurrent problem. Using the tradition of Land Improvement Districts, which was sufficiently adaptable, new technology was deployed to develop the basin with diverted water from the river through new canal systems. This basin development has played a significant role in reducing the frequency and the effect of droughts and floods in the area. Storage of diverted water serves to regulate flows and make water available on a more uniform basis throughout the basin. New technology has added automated control systems to the traditional LID procedures for better water resources management.

4.5 Performance Assessment and Institutional Analysis

The study component on performance assessment is designed to be limited to irrigated agriculture within the selected river basin. This decision was taken at the inception of the study, so that the available study resources would be best spent by focusing on the basin-wide influences on the major water use and the productivity of agricultural water management. Although this strategy agrees with the Terms of Reference of the Study as well, the study is still designed to assess the need for coordination mechanisms in the institutional framework that would eventually contribute to improved productivity of agricultural water management.

Once the current performance levels of irrigated agriculture are assessed (following the indicators given in the Methodological Guidelines), the influence of the existing institutional arrangements on the production processes are to be identified.

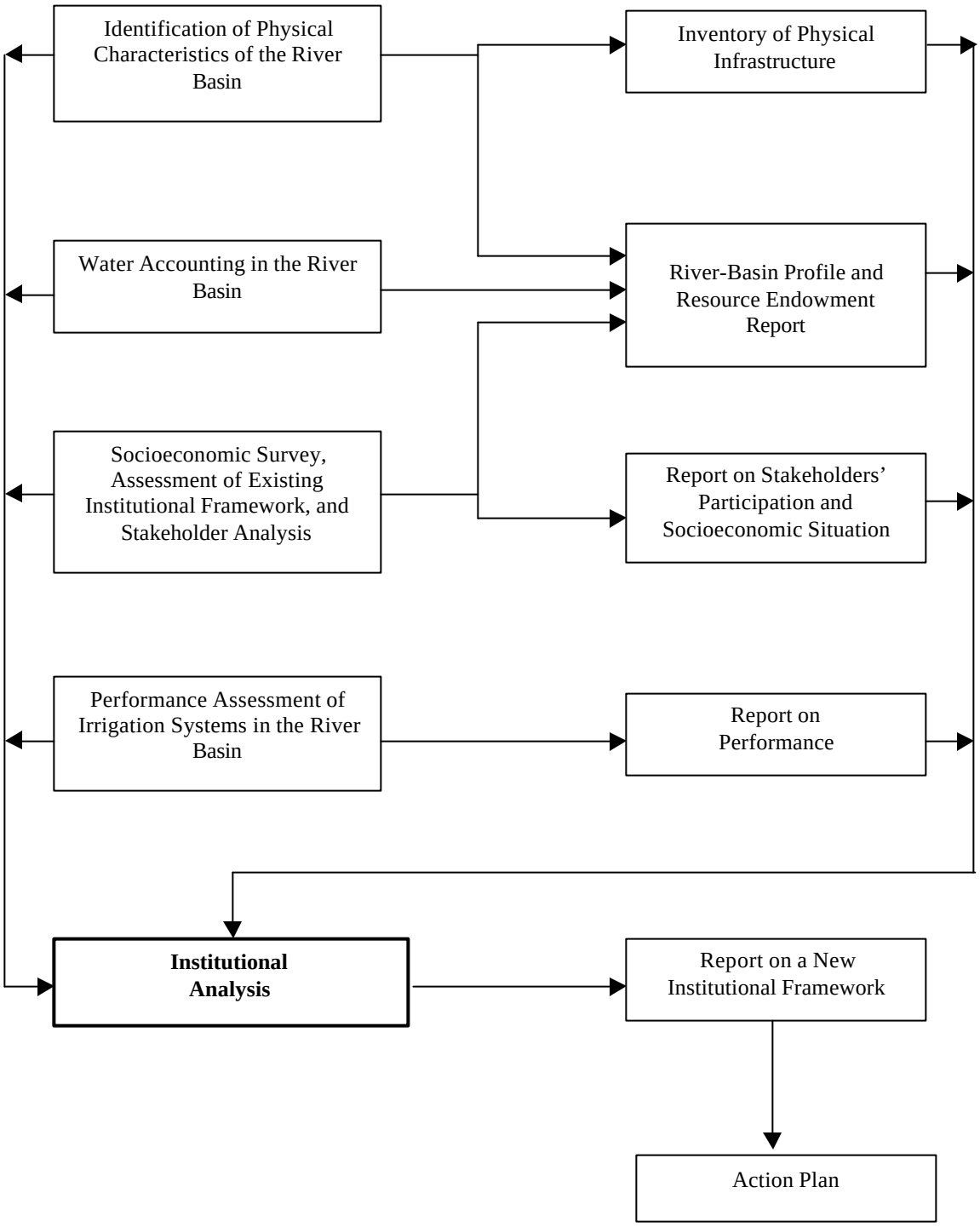
As explained in section in 2.3 above, the study design considers that the institutional framework is a necessary condition for entrepreneurs or members of an organization to perform in the pursuit of their objectives subject to leadership and coordination provided by management. So far as this document has presented, its main focus is on the institutional arrangements, and stops short of proceeding to assess the efficiency of management functions. The main task at this stage of the study is to evaluate whether the existing institutional framework negatively constrains the performance of management tasks.

4.6 Institutional Analysis for an Action Plan

In the process of studying these different aspects, the study groups have an opportunity to understand the site-specific and country-specific institutional environments and their influence on developing and implementing new institutional strategies aimed at improved agricultural water management. As the study progresses, the study teams are expected to develop draft reports on these components. Figure 5 shows the linkages between these various contextual aspects and their study outputs, including how they are all leading to a final institutional analysis and a related action plan.

In sum, the diagnostic phase of the study provides an appreciation of the whole river basin, its physical and socioeconomic characteristics and its current performance levels. Along with these aspects, all forms of institutions related to water resources development and management within the selected river basin are identified. Performance of the management system should be assessed in relation to this existing institutional framework. After areas for performance improvement and the scope of possible improvements are identified, institutional analysis can be carried out to identify improvements to be effected to the existing institutional framework.

Figure 5. Main study activities and outputs.



5. HINTS FOR FORMULATING INSTITUTIONAL CHANGE

It is useful for us to appreciate some important issues and constraints related to institutional change. Such an appreciation would help the analysts to identify the effects of these issues and constraints in the given context, and explore how best these constraints can be overcome in an attempt to formulate and introduce change.

5.1 "Rules-in-Use"

In analyzing the institutional framework, it is useful to realize that declared rules, or formal institutions, can change in character in their actual use in the given context. Forces of tradition, such as feudalism, caste and kinship have a greater influence on people's lives than the written codes of law. The difference between declared rules and rules-in-use is an important consideration for evaluating institutional arrangements for water management, which is a field in which social relationships play a significant role. In fact, some analysts of irrigation institutions have defined institutions as the "rules-in-use" (Ostrom 1992), as they are more commonly acceptable than the declared rules.

Depending on the socioeconomic context, the formal institutions designed to govern human conduct in an orderly manner can give way to a flexible and adjustable set of rules. For instance, a recent study in a sample of twenty-two watercourses in Pakistan's Punjab did not find a single official *warabandi* water allocation schedule in practice as originally designed (Bandaragoda and Rehman 1995).

The importance of understanding rules-in use as against declared rules in water management lies in the complex nature of the rural society itself, which is closely associated with water management. For example, farmers are not a homogeneous group. Different groups of farmers (large, small, rich, poor) have different sets of goals and objectives, and different alliances. The value attached to formal rules by this heterogeneous group depends on their varying objectives and backgrounds, and over time, the rule-in-use becomes what the majority has modified and accepted.

5.2 Rule Enforcement

In terms of the transaction cost theory, the functioning of institutions depends on the costliness of enforcement (North 1990:4). The gap between the declared rules and the rules-in-use is also basically a result of the laxity in rule application and enforcement, which may well be due to the higher cost of enforcement. Therefore, in institutional analysis, there is a need to look into the enforceability of existing formal rules. Based on such information, consideration can be given to enforcement and related costs in the formulation of new institutions.

5.3 Role of the Elite in Institutional Development

Some analysts attach considerable value to power and politics in establishing, maintaining, and changing institutions. For instance, Arthur Stinchcombe in his book *Constructing Social Theories* defined an institution as "a structure in which powerful people are committed to some value or interest" (Powell and DiMaggio 1991:191).

Normally, in many countries, policies, and institutions based on policies, are established by the influence of a few elite, either among professionals, or among powerful political leaders, or of a combination of both. Once established, the institutional framework becomes useful for maintaining or expanding their power base, or perpetuating their interests. Classic examples are from the international order, the power implications of the UN system or other similar multilateral institutional arrangements like GATT or World Trade Organization. Much less visible examples are plenty in the national political and administrative arena in any country, including the way the political parties are established and developed, and how resource allocation is effected.

Lobby groups are invariably related to the various power blocks, which bring to bear their influence in creating the so called "public opinion." Imposition and releasing of many forms of control or concession stem from some interest group or other. Who eventually succeeds in establishing norms or practices would depend on which group has greater political power. The validity of this argument is very much relevant to our efforts in analyzing and developing effective water management institutions within a river basin.

The analysis should therefore essentially explore the role of influential persons and groups in shaping the existing institutional framework by, first, exploring the possible power implications of its existence. This knowledge would help in taking due care to ensure that more democratic and participatory approaches are deployed to reduce inequity in future action plans.

With this reality in view, at least an awareness can be built to help in formulating practical and realistic modifications to the existing institutions.

5.4 Difficulty in Effecting Institutional Change

Despite the dynamic nature of institutions, purposively effecting institutional change is not easy. The main reason for this difficulty is the stability of well-established institutions, which are in equilibrium at any given point of time.

Various institutional components are intrinsically interlinked; like planets and stars in a solar system, they are in some dynamic form of balance or equilibrium. Policies on agriculture and water, including those on subsidies, trade, rural industries and land reform; the legal system covering land and water resources management; and various organizations set up to implement projects and programs are some of these interlinked institutional elements. In the context of water resources management for agriculture, these linkages are crossing the boundaries of various categories and groups of people, adding to the complexity. For instance, some farmers are more closely linked with agency staff than with the farming community; people shift their political alliances when their

leaders change parties. Politicians from rural electorates may have an urban bias in their policy preferences.

Thus, a particular element of institutions is so deeply embedded in a network of such similar elements and networks of relationships that an intended change in one institutional element involves corresponding reactions from other elements in the network. This difficulty of change inherent in institutions explains why some institutions remain in practice or in the statute book, despite its obsolescence or its counterproductive nature.

Rules-in-use (section 5.1) are more difficult to change. A case in point is the difficulty in changing a particular cropping pattern or calendar that has been in practice for some time. While formal rules on equitable water allocation may exist in the rule book, farmers may have been accustomed to flexible water distribution. Dislodging a well-established practice such as free riding by the head-end water users in a canal system has not been proved easy in many places. To change them by a mere regulation or new structure is simply impossible. A greater chance of a change may exist if the change covers a wider area of practices, procedures or structures, such as those meant for water measurement, water delivery, equitable distribution of water, and even broader policy areas aimed at distribution of productive assets and ensuring accountability.

Similarly, it is equally difficult to introduce some useful institutional element even if the majority accepts it. The major reason for this is the cost of introducing change through a multitude of agencies and their procedures. In either of these cases, two countervailing forces act against change in the existing institutional framework. One is the common interconnectedness of many institutional elements, some of which may have substantial value to the society at large where the overall cost of a change is more than its apparent "direct" cost. The other is the procedural constraints in the introduction of change, including the popularly known "resistance to change" (even to change the name of an established organization is much more difficult than usually expected).

Both these aspects coincide in what North (1990: Chapter 4) describes as "transaction costs" of exchange, the key to which is presented as the costliness of information, and processing information. The daunting aspect of this explanation is that transaction costs are increasing; within a century, the proportion of the US national economy devoted to transacting has increased from 25 percent to 45 percent. Many other countries may have similar experience in escalating transaction costs.

Institutions typically change incrementally rather than in discontinuous fashion (North 1990:6). Even if some quick change is anticipated by a new policy or law, it is fairly common that the society adopts it slowly. The main reason for this incremental change is that there are many institutional elements which are interconnected, and a change gets cushioned by many other established institutional elements.

5.5 Replicability of Success Stories

The design of the regional study presupposes that lessons can be learnt from developed country experiences of successful institutional development. With this possibility in view, the study proceeds to develop case studies of advanced river basins. However, attempts at replication or

transplanting of institutional models have not been very successful in some of the countries under study (e.g., Sri Lanka, Philippines). It is therefore useful to understand whether there are special conditions under which such attempts could be successful. There is a need to analyze the local situations in that light to explore whether they could absorb some identified lessons from elsewhere, to make the local institutional framework more effective in achieving improved integrated water resources management within river basins.

Experience suggests that transfer of institutional models is not easy. Hunt (1999) found in an analysis of conditions in Australia and neighboring Solomon Islands that "direct transposition of user pays policy was not sustainably viable." His analysis included a number of contextual factors that seemed to sharply vary in effect in the two contexts: political structure, stability of national priorities, living standards, technical development levels, literacy levels, financial management and infrastructure development levels. More importantly, change management in the developing countries was seen as so volatile that a developed country policy or institutional model would not have a chance of gaining root in an extreme instance of change management.

A similar study involving the possibility of transferring the river-basin management model in Australia to Vietnam concluded that the hydrological and socioeconomic contexts would be the major determinant of the transferability (Malano, Bryant and Turral 1996). While general principles of good allocation and rational water resources management are transferable from one context to another, no package or formula in doing so is viable. This study also found that even in Australia, the two political units, New South Wales and Victoria had two different paths of institutional development, though within the same Murray-Darling river basin, implying that local-level conditions and initiatives for change are vital in establishing new policies and institutions for water resources management. A study of the socioeconomic and hydrological context in a given river basin is, therefore, essential to identify the suitable strategies for absorbing even general principles from other situations.

However, despite the contextual differences in river basins, White (1977) has acknowledged that developing countries, which have special problems of water management, should be able to "profit from the lessons learned in the nations which have made heavier investments in engineering work." In a more recent study of comparing river-basin-development experiences in the Mississippi and the Mekong, the conclusion was that both these large basins were having the same challenge of sustaining the ecological integrity of the basin, and that Mekong could learn some lessons from the Mississippi's longer development experience (Jacobs 1999).

5.6 Participatory Approach to Institutional Change

5.6.1 Institutional Adaptation

In view of difficulties in the transposition of institutional models from one context to another, the suggested approach is "institutional adaptation." This method assumes that the contextual factors assessed during the initial diagnostic phase of the study would form the foundation for analyzing the necessary institutional arrangements for improving agricultural water management in the context of integrated water management within the selected river basin. The method also assumes

that a participatory approach involving all of the stakeholder groups through a series of consultation meetings would be the best way of developing appropriate institutional strategies. The outcome of these interventions would be an adaptation of the existing institutional framework to accommodate the identified needs for improvement, rather than the total transposition of an institutional framework that exists, and works well, elsewhere. Lessons from success stories elsewhere will only be used in the needs identification, which too is to be collectively effected by the local stakeholder groups.

5.6.2 Value of Stakeholder Participation

The advantage of participation by user groups and other stakeholders would be the facility in identifying appropriate institutional measures for effectively attending to a number of resource management needs: arresting free-rider behavior among the members, mobilizing the needed financial and labor resources, imposing sanctions on individual members for resource degradation, providing incentives for resource saving, interacting with the government and other individuals and organizations such as suppliers, contractors and purchasers of produce, and developing and implementing group decisions for equitable resource distribution and environmental protection.

5.6.3 Role of Facilitators

With this suggested approach, the value of research and expert advice becomes an issue. To what extent can research guide a group of stakeholders in policy-oriented decisions? An apt reply came in the form of recommendations at the end of the UNESCO World Conference on Science, the main thrust being that public participation would certainly serve to extract the best of lessons and advice (see box 4).

In a genuinely participatory approach, outsiders can play only a facilitating role. Helping the people to help themselves and reach a reasonable degree of stability and strength in community participation is very often a time-consuming process. Their effective participation in resource management, however, depends on the degree of their awareness of important technical considerations. Social organization to establish manageable groups within the community helps not only in bringing about this required awareness through various capacity building measures, but also in developing capability for collective action through effective participation.

A facilitating role by experts will also include capacity building among the stakeholder groups to understand and appreciate the main principles of integrated water resources management in the context of a river basin, and the capability for performing essential management tasks.

Box 4. Declaration of the international conference on Participatory Processes in Water Management (PPWM): Satellite conference to UNESCO's World Conference on Science, Budapest, Hungary, June 1999.

"Science is a necessary but insufficient basis for public policy decisions. Science informs policy decisions by providing the factual basis upon which decisions can be made, and alerts decision makers to the degrees of certainty or uncertainty associated with these facts. But decisions about public policy inevitably involve choices among competing visions of the kinds of societies in which we want to live.

"Public participation is a precondition for social acceptance of public policy decisions. Public participation informs public policy decisions with the goals and aspirations of those people who believe themselves or their societies to be affected by these decisions. Participation is a process of mutual education amongst the public, scientists, and decision makers about public concerns, the factual basis for the decision, and the process of decision making itself. The transparency of the process deepens the trust between the public and policy makers, and also the trust between the public and the scientific community.

"Public participation must meet the following requirements before it will ensure legitimacy and credibility for science decisions:

1. *The public should have a say in decisions about actions that affect their lives;*
2. *Public participation includes the promise that the public's contribution will influence the decision;*
3. *The public participation process is effective if it (a) actively seeks out and facilitates the involvement of those potentially affected at all levels of society, (b) provides participants with the information they need to participate meaningfully, and (c) creates a forum for discourse and interaction with others who are potentially affected, with the scientific community and policy decision makers.*

"Public participation is a catalyst for more responsive governance. The conference concluded that public participation is an essential precursor for sustainability of both the environment and civil society."

Source: Water International 1999.

6. GUIDELINES FOR INSTITUTIONAL ANALYSIS

This section outlines some guidelines for proceeding to institutional analysis based on the foregoing. Particularly, the conceptual background on institutions, organizations and management performance outlined in section 2 and the river-basin perspective of integrated water resources management outlined in section 3, and the chosen definition of institutions referred to in section 2.4 will form the basis of these brief guidelines.

The analysis of diagnostic study components given in section 4 and the hints for institutional change outlined in section 5 are meant to supplement these guidelines.

6.1 Main Components of Water Institutions

The definition adopted for our study is given in box 1 in section 2.4 of this document. Accordingly, following the analysis of Saleth and Dinar (1999a; 1999b), the water management institutions are categorized into three main components: water policies, water laws, and water administration. These components include most of the institutional aspects referred to in section 2. The categorization of key elements is as given in box 5, which is adapted from Saleth and Dinar 1999b.

Box 5. Water-related institutions.

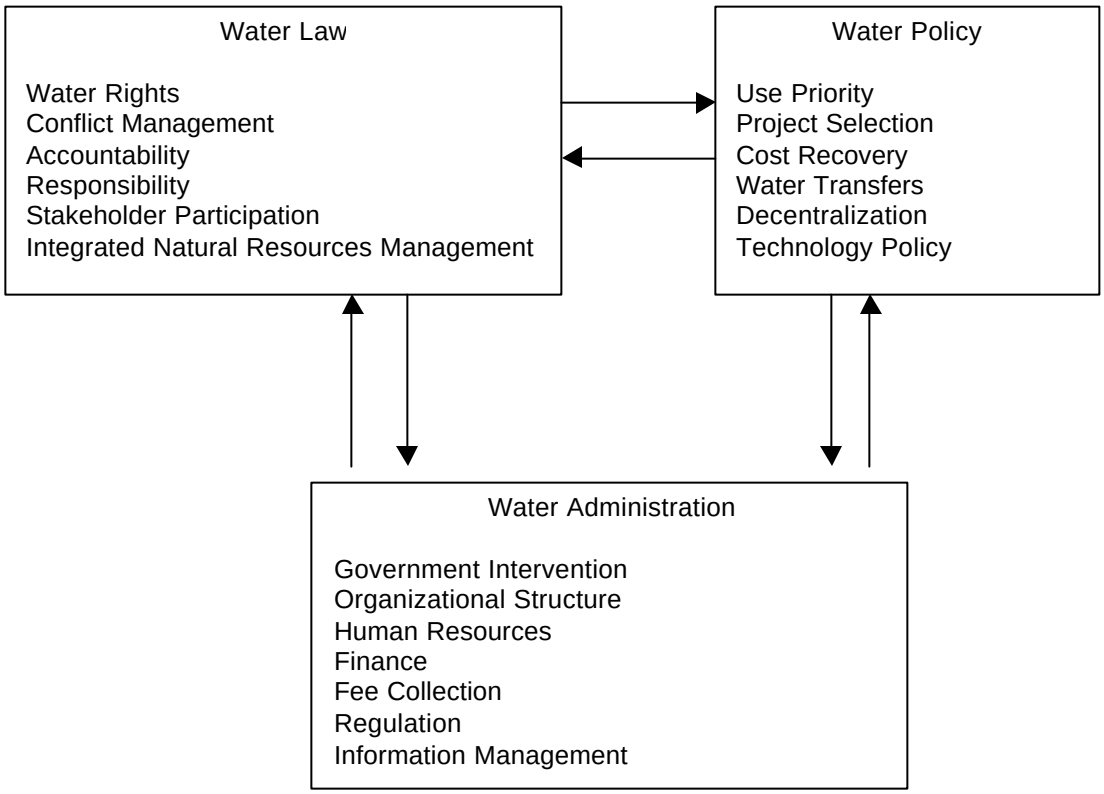
Water Law
- *Legal coverage of water and related resources*
- *Water rights*
- *Provisions for conflict resolution*
- *Provisions for accountability*
- *Scope for public/private sector participation*
- *Centralized regulatory mechanisms*
- *Integration of overall legal framework with water law*

Water Policy
- *Project selection criteria*
- *Pricing and cost recovery*
- *Water allocation and transfers*
- *Economic participation*
- *User participation*
- *Linkages with other economic policies*

Water Administration
- *Formal organizations*
- *Organizational procedures*
- *Pricing, finance and accountability mechanisms*
- *Information, research and extension systems*

Some of the institutional aspects seem to belong to more than one category. This is so because there are close linkages between the three components. For example, water law usually empowers water policy, and water policy, in turn, could initiate a process for a new water law. The two components enrich each other. Together they define the structure for the functioning of water administration. The interlinkages of the three institutional components in terms of resources, social capacities, and overall economic objectives can be seen in figure 6, which is extracted from Saleth and Dinar 1999b.

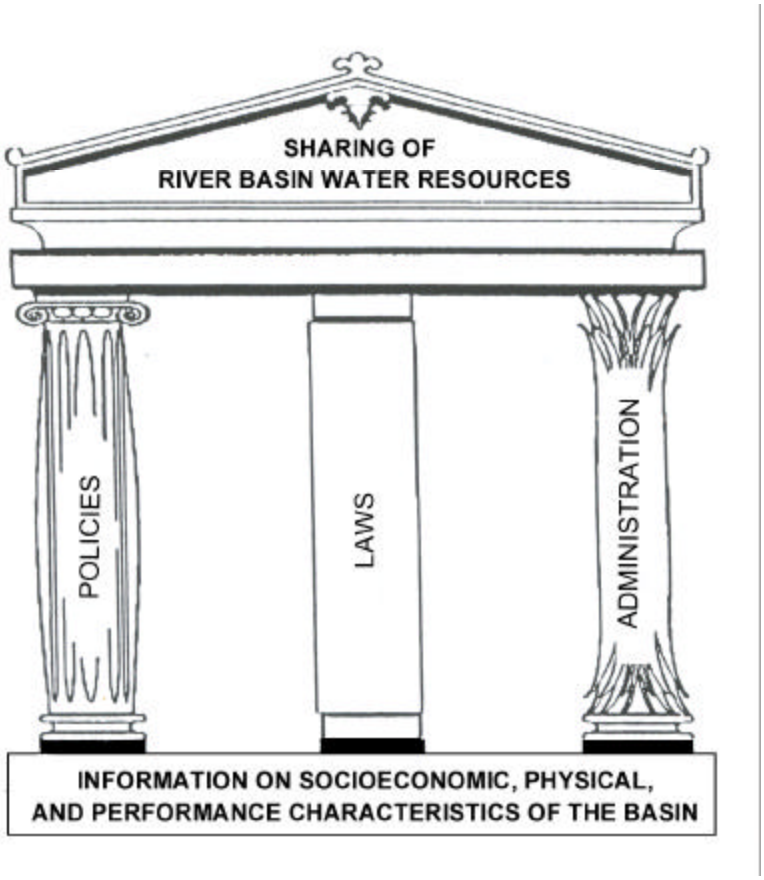
Figure 6. Interlinkages among institutional components (adapted from Saleth and Dinar 1999b).



6.2 Classical Temple Metaphor of Institutional Analysis

The metaphor of the classical temple is an appropriate illustration of the combination of principles, processes and activities involved in this suggested method of institutional analysis based on the chosen definition of the institutional framework. Figure 7 depicts this metaphor as adapted from its use by Savenije and van der Zaag (1998). The framework rests on the foundation of diagnostic studies and supported by three pillars of key institutional areas.

Figure 7. The classical temple metaphor indicating river basin institutional development.



The four study components conducted in each river basin comprise the foundation for the analysis. Although they are mostly in noninstitutional aspects of the basin, as discussed in section 4, each component can be related to the institutional framework of the basin. Steps 1–3 mentioned above will accomplish the work envisaged for this foundation.

6.3 Three Pillars of Institutional Analysis

Following the definition adopted in section 2.4, Laws, Policies and Administration are the three pillars of the institutional framework for integrated water resources management in a river-basin context. They are very broad categories of institutional elements, and each category, as illustrated in box 5, can consist of a number of institutional elements.

6.3.1 The Pillar of Laws

The legal framework is a very complex set of enactments, subsidiary laws, rules, regulations and procedures, and rights, customs and practices. They are also divided in terms of sources, such as

national, local and village-level assemblies. There can be laws affecting water management, and laws directly related to water management. The activity that may have been already accomplished during the diagnostic phase could be the inventorying of these legal elements. At this stage of the analysis, each element can be evaluated according to the procedure given in sections 6.3 and 6.4.

6.3.2 The Pillar of Policies

Policies are also determined by a number of actors at national, local or organizational level. Usually, policies and laws are interlinked at the sources, as well as at the implementation level. In some countries, a water policy has already been established, and they are in the process of formulating laws to implement them. In the analysis, the elements of this policy framework should be subjected to closer scrutiny in terms of the procedure indicated in sections 6.3 and 6.4.

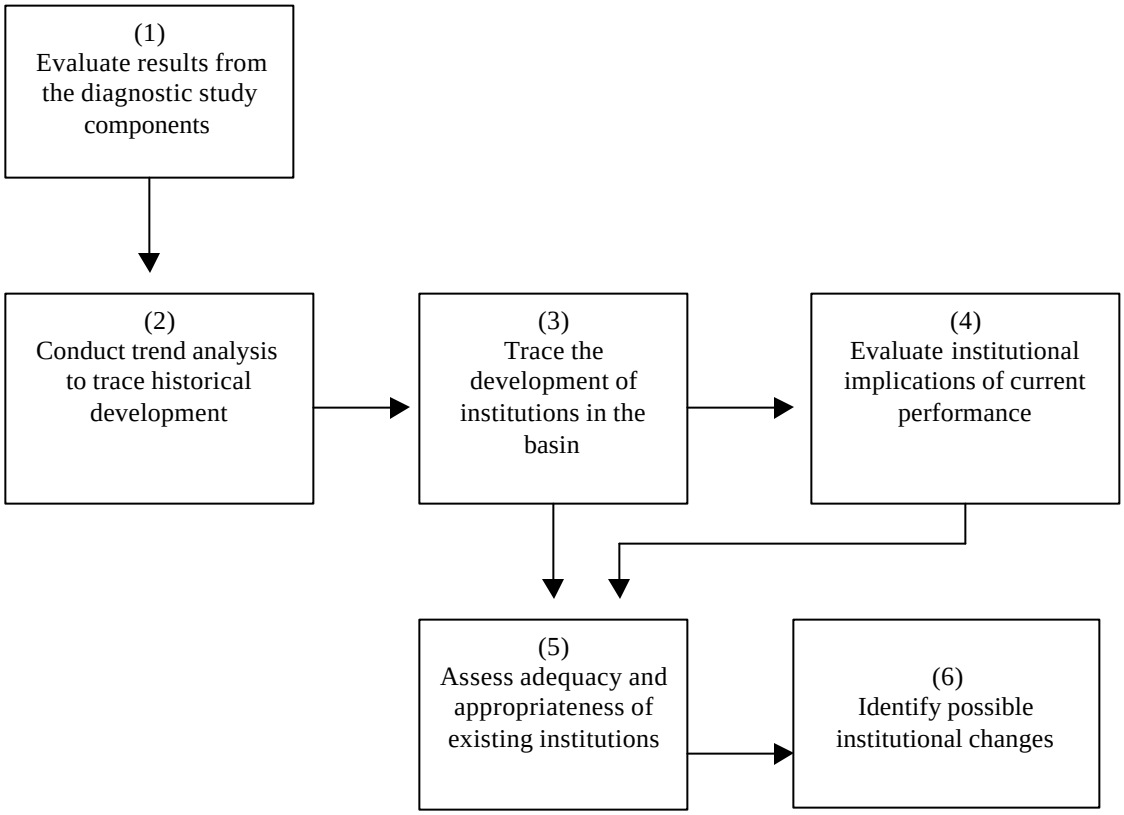
6.3.3. The Pillar of Administration

Administration here means the organizations involved in water management and their internal rules. The process of management is not included. The organizations are necessary for two levels: resource management and delivery management (see section 6.5). The evaluation of these organizational elements needs to be conducted in terms of procedures indicated in sections 6.3 and 6.4 to explore their effectiveness to undertake coordination among various water use sectors in the river basin, data collection and processing for monitoring purposes, application of water rights, and enforcing various rules related to water management within the river basin.

6.4 Suggested Method for Institutional Analysis

The methodological steps that are suggested to be taken in analyzing institutions on the basis of study activities already undertaken are shown in figure 8, which gives a simple flow chart to depict the interrelationships among the steps.

Figure 8. Steps in institutional analysis.



A brief description of each of the six steps is given below:

1. Evaluate the results from four diagnostic study components conducted in the basin (Physical System, Water Accounting, Socioeconomic Situation, and Performance Assessment) to identify institutional implications arising from them.

2. Conduct trend analyses in water availability, water use, infrastructure development and agricultural and irrigation performance to trace the historical development of the river basin.

3. Trace the development of the existing institutional framework related to water management in the basin and compare it with the physical development of the basin over time.

4. Evaluate the institutional implications of current performance levels, to identify key areas of policies, laws and organizational arrangements, which may need to be improved for improved performance.

5. Assess the adequacy and the appropriateness of each key element in the existing institutional framework with reference to steps 1 to 4 above.

6. Identify possible institutional changes.

Some of these steps have already been accomplished in conducting the diagnostic study components in the selected river basins. However, a recapitulation of what has been done according to these steps would give a more structured methodology.

Attention is drawn to relevant sections in the Methodological Guidelines (Samad and Bandaragoda 1999), particularly to section 8 (Stakeholder Analysis), including the procedure on developing a responsibility matrix, and also to appendix 3, which gives a check list for identifying the existing institutional framework.

In a number of areas of data collection and analysis, a trend analysis is highly recommended. This suggestion is strongly grounded on the proposition that an activity to trace the historical development of the basin would throw light on many important aspects of institutional development that have taken place, including the quality of the existing institutional framework in terms of its appropriateness and adequacy. More importantly, it will help in identifying the potential for improvement.

6.5 Appropriateness and Adequacy

The following key questions are relevant for assessing whether each institutional element is appropriate and adequate for the current situation in the selected river basin.

Is the institutional element (any element related to laws, policies or organizational arrangements) suitable and adequate for:

- the existing physical system in the basin, in terms of soil conditions, topology, rainfall, seasonal weather variations, etc.?
- the water availability and quality situation in the basin?
- the existing physical infrastructure available in the basin?
- the existing socioeconomic situation in the basin?
- the current technology used for operations?
- the current performance levels?

This initial evaluation procedure will naturally raise a further set of similar questions on the basis that the existing situation may need some changes. The analyst will have to assume the potential extent and quality of the changes possible and try to relate the answers to suit a domain of attainability.

Each identified institutional element needs to be assessed to ascertain their appropriateness and their adequacy in terms of the potential for performance improvement (figure 9).

After effecting institutional analysis and designing the necessary institutional changes, the action research phase of the study will test the viability of implementing the changes in the existing institutional framework. As has been emphasized in several places of this document, an improved institutional framework is not a sufficient condition for improving performance. An essential requirement is to ensure that individuals and groups are motivated to achieve desired objectives. For this purpose, appropriate management strategies are necessary.

6.6 Two Levels of Management

Institutions are necessary for two distinct levels of management: higher-level resources management and lower-level delivery management. Although the set of institutions can collectively cover both levels, often separate organizations are useful to handle the two levels of management tasks. As has been highlighted in other institutional studies (IWMI's BMZ-supported parallel study on "Institutional Support Systems for Sustainable Local Management of Irrigation in Water-Short Basins"), a set of minimum management tasks will form the basis for a functional approach to integrated water resources management.

The Asian Development Bank has suggested a somewhat related functional approach for "National Water Sector Profiles" (Arriëns et al. 1996: Vol. 2, appendix A) from which future developments of this framework document will also draw.

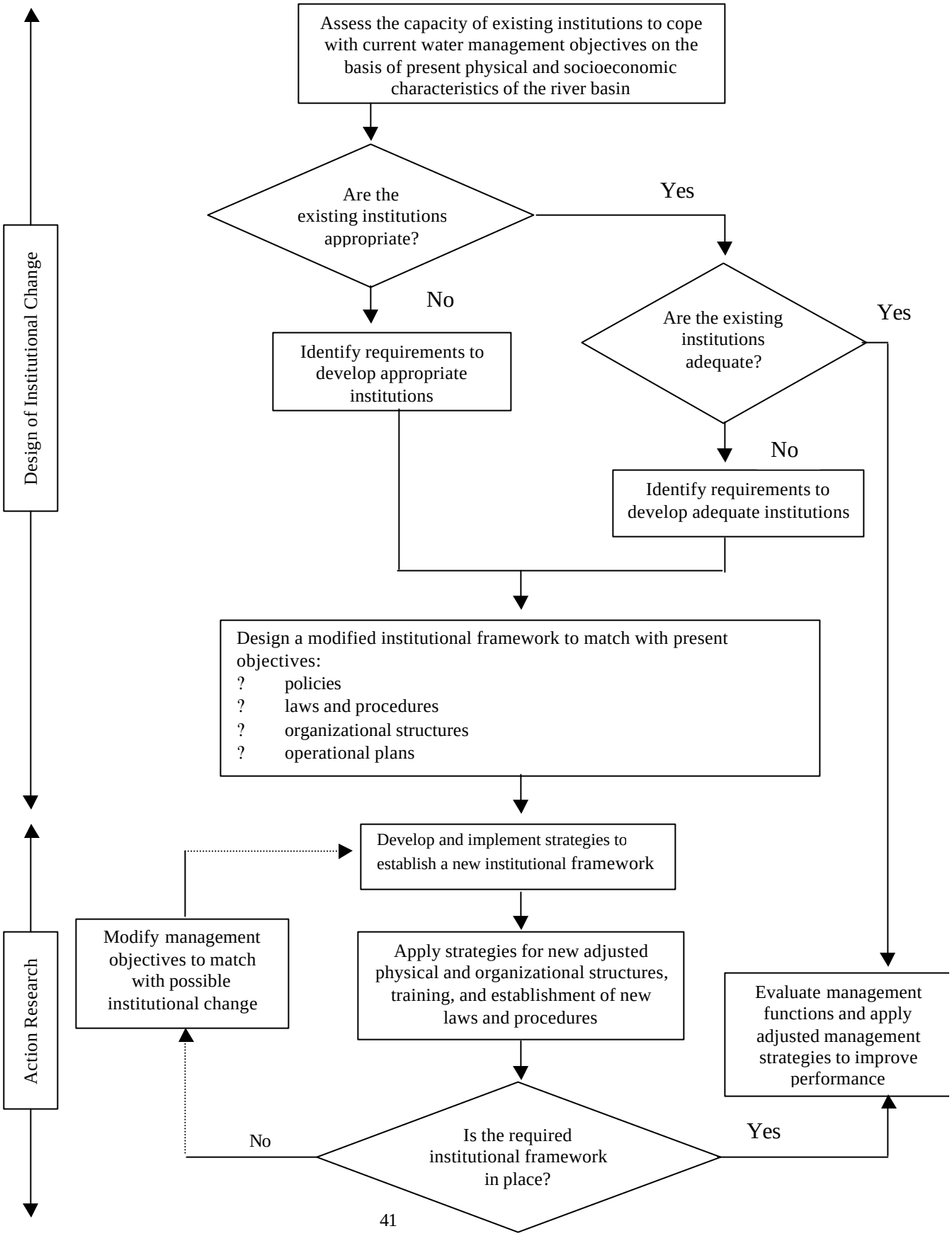
A more recent study report makes a distinction between management of water resources and delivery of water services, and lists a number of key management functions under five categories (Berkoff 1997). The report also points out that functions are distinct from the agencies that could be assigned to perform them, although in a holistic management approach, one agency may be required to have a role in more than one function.

A basic division of various management functions between these two levels can be conceptualized as the distribution given below:

6.6.1 Water Resources Management Functions

? Policy formulation
? Data collection and dissemination
? Planning
? Public participation and interorganizational coordination
? Research and Evaluation
? Regulation
? Resource mobilization and macro-level resource allocation

Figure 9. Institutional development for improved performance.



6.6.2 Water Service Delivery Functions

? Design
? Construction
? Operation and Maintenance
? Monitoring and Evaluation

6.7 Strategic Planning

While the institutional framework encompassing both these management levels needs to be analyzed, a state-of-the-art management strategy also needs to be developed, particularly as a guide to be followed during the action phase envisaged in this regional study. Strategic planning will form an essential preparatory task at the beginning of this action phase.

As river-basin resources reach full commitment, the interactions at the basin level become critical. Consumption increases in one area must be offset by corresponding decreases at another; poorer quality effluent in an upstream area has direct impacts on downstream entitlements. Other issues—flood zoning, safety and operation of dams— must, of course, always be regulated and administered at the basin level. Thus the scope of management required is widening and the attention is moving progressively upwards, but the strength of higher-level institutions is probably declining precisely as this is happening. This institutional weakness needs to be remedied in a search for strategies in improving the productivity of agricultural water management.

As the largest user of water in most developing-country river basins, better agricultural water management will be the key factor in the long-term sustainable water use in water-scarce river basins. As most basin areas and most stakeholders are both linked with using water resources for agriculture, the minimum set of management tasks can be assessed more closely for agricultural production.

Each water basin is seen as unique in its features, physical, social, environmental and economic. Depending on the contextual factors, the minimum set of management tasks can also be ordered according to their importance. A composite performance indicator may be used to capture the relative importance of these various tasks, and of the different water uses within the basin.

The institutional analysis will finally be aimed at identifying effective institutional arrangements for agricultural water management at two levels in the context of integrated water resources management in a river basin. At the macro-level or basin (or subbasin) level, analysis will deal with institutional arrangements that concern inter-sectoral allocation of water such as for irrigation, domestic water supply, hydropower, environmental purposes and other uses which depend on a common water source. The service-level analysis will focus institutional issues relating to the multiple use of water within the irrigation service area. At this level, interest in other subsectors will only be to the extent that they affect agricultural water use either directly or indirectly. The water users' collective action bodies will be part of this level of institutional development.

Literature Cited

Abernethy, C. ed. 1996. *The institutional framework for irrigation.* Proceedings of a Workshop held in Chiang Mai, Thailand, 1-5 November 1993. Colombo, Sri Lanka: Irrigation Management Institute.

Arriëns, W. L.; J. Bird; J. Berkoff; and P. Mosley. 1996. *Towards effective water policy in the Asian and Pacific Region.* (3 volumes). Proceedings of the Regional Consultation Workshop, 10-14 May 1996, Manila, Philippines. Manila: Asian Development Bank.

Bandaragoda, D. J.; and G. R. Firdousi. 1992. *Institutional factors affecting irrigation performance in Pakistan: Research and policy priorities.* IIMI Country Paper - Pakistan No. 4. Colombo, Sri Lanka: International Irrigation Management Institute.

Bandaragoda D. J.; and S. U. Rehman. 1995. *Warabandi in Pakistan's canal irrigation systems: Widening gap between theory and practice.* IIMI Country Paper - Pakistan No. 7, Colombo, Sri Lanka: International Irrigation Management Institute.

Berkoff, D. J. W. 1997. Water resources functional analysis. Consultancy report prepared for the Water Resources Secretariat, Colombo, Sri Lanka.

Bromley, D.W. 1987. Irrigation institutions: The myth of management. In *Water and water policy in the world food supplies,* ed. Wayne R. Jordan. College Station, USA: Texas University Press.

Cernea, Michael. M. 1987. *Farmer organization and institution building for sustainable development, regional development dialogue.* Vol. 8, No. 2. Nagoya, Japan: United Nations Center for Regional Development.

Hunt, Chris. 1999. Transposing of water policies from developed to developing countries: The case of user pays. *Water International* 24(4): 293–306. (December 1999)

ICWE (International Conference on Water and the Environment). 1992. The Dublin statement and report. In *International Conference on Water and the Environment: Development Issues for the 21st century, Dublin*.

International Water Resources Association. 1999. Conference reports. *Water International* 24 (3): 277–278. (September 1999)

Jacobs, Jeffrey W. 1999. Comparing river basin development experiences in the Mississippi and the Mekong. *Water International* 24(3):196–203.

Jepperson, Ronald L. 1991. Institutions, institutional effects, and institutionalism. In *Institutionalism in organizational analysis*, ed. Walter W. Powell and Paul J. DiMaggio. Chicago: University of Chicago Press.

Lachmann, L. M. 1971. *The legacy of Max Weber.* Berkeley, California: Glendessary Press.

Malano, Hector M.; Michael J. Bryant; and Hugh N. Turral. 1999. Management of water resources: Can Australian experiences be transferred to Vietnam? *Water International* 24 (4): 307–315. (December 1999).

Merrey, Douglas, J. 1993. Institutional contexts for managing irrigated agriculture. In *The institutional framework for irrigation*, 1996, ed. C. Abernethy, 7–22. Proceedings of a Workshop held in Chiang Mai, Thailand, 1-5 November 1993. Colombo, Sri Lanka: International Irrigation Management Institute.

Molden, David; and R. Sakthivadivel. 1999. Water accounting to assess use and productivity of water. *International Journal of Water Resources Development* 15 (1&2): 55–73.

Moore, Lew; Craig Philiip; and Allen Powers. 1994. Technical and institutional innovations changing water resources management and allocation in the Western United States. In *Efficient water use*, ed. H. Garduno and F. Arreguin-Cortes, 311–321. Mentevieo, Uruguay: UNESCO.

Mosley, M. Paul. 1996. A participatory process approach to development of a comprehensive water resources management plan for Sri Lanka. *Water International* 21 (4): 191–197.

North, Douglas C. 1990. *Institutions, institutional change and economic performance.* New York: Cambridge University Press.

Ostrom, Elinor. 1992. *Crafting institutions for self governing irrigation systems.* San Francisco, California: Institute of Contemporary Studies.

Perry, C. J. 1999. The IIMI water resources paradigm-definitions and implications. *Agriculture Water Management* 40:45–50.

Powell, Walter W.; and Paul J. DiMaggio. 1991. *Institutionalism in organizational analysis.* Chicago: University of Chicago Press.

Saleth, Maria, R.; and Ariel Dinar. 1999a. *Water challenge and institutional response.* (A Cross-Country Perspective), Policy Research Working Paper 2045. Washington D.C.: The World Bank.

Saleth, Maria, R.; and Ariel Dinar. 1999b. *Evaluating water institutions and water sector performance.* World Bank Technical Paper No. 447. Washington D.C.: The World Bank.

Samad, M.; and Tissa Bandaragoda. 1999. *Methodological guidelines for the five-country regional study on development of effective water management institutions.* Colombo, Sri Lanka: International Water Management Institute.

Savenije, Hubert H. G.; and Pieter van der Zaag. 1998. The management of shared river basins: Focus on development. Ministry of Foreign Affairs, The Hague. Revised and published as "Conceptual framework for the management of shared river basins; with special reference to SADC and EU." *Water Policy* 2(1–2). The Hague: Elsevier Science Ltd.

Seckler, D. 1996. *The new era of water resource management: From "dry" to "wet" water savings*. Research Report 3. Colombo Sri Lanka: International Irrigation Management Institute.

White, G. F. 1957. A perspective of river basin development. *Law and Contemporary Problems* 22(157–184).

White, G. F. 1977. Comparative analysis of complex river development. In *Environmental effects of complex river development*, ed. G. F. White, 1–21. Boulder, Colorado, USA: Westview Press.

Postal Address
P O Box 2075
Colombo
Sri Lanka

Location
127, Sunil Mawatha
Pelawatta
Battaramulla
Sri Lanka

Tel.
94-1-867404, 869080

Fax
94-1-866854

E-mail
iwmi@cgiar.org

Website
www.iwmi.org

IWMI
INTERNATIONAL WATER MANAGEMENT INSTITUTE

FUTURE HARVEST
IWMI is a Future Harvest Center
Supported by the CGIAR