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WORLD BANK TECHNICAL PAPER NO. 354

WTP354
April 1997

User Organizations for Sustainable Water Services



Edited by
Ashok Subramanian
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User Organizations for Sustainable Water Services

Edited by
Ashok Subramanian
N. Vijay Jagannathan
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The World Bank
Washington, D.C.

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and Development/THE WORLD BANK
1818 H Street, N.W
Washington, D.C. 20433, U.S.A

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First printing April 1997

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ISBN 0-8213-3855-2
ISSN. 0253-7494

Cover photographs by Herve Plusquellec and Ruth Meinzen-Dick.

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Library of Congress Cataloging-in-Publication Data

User organizations for sustainable water services / edited by Ashok Subramanian, N. Vijay Jagannathan, Ruth Meinzen-Dick.

p. cm. — (World Bank technical paper ; 354)

Includes bibliographical references (p.).

ISBN 0-8213-3855-2

1. Water utilities—Management—Citizen participation
2. Irrigation projects—Management—Citizen participation.
3. Sanitation—Management—Citizen participation. 4 Citizens' associations. I. Subramanian, Ashok, 1950- . II. Jagannathan, N. Vijay III. Meinzen-Dick, Ruth Suseela IV Series.

HD4456.U83 1997

363.6'1—dc21

96-51884

CIP

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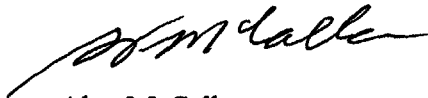
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FOREWORD

User participation is a key element in the Bank's Water Resources Management Policy (1993): *"Participation is a process in which stakeholders influence policy formulation, alternative designs, investment choices, and management decisions affecting their communities and establish the necessary sense of ownership. As communities increase their participation in managing water resources, project selection, service delivery, and cost recovery will likely improve. Therefore, the Bank will encourage the participation of beneficiaries and affected parties in planning, designing, implementing and managing the projects it supports."* This volume is an attempt to identify means ways of promoting such participation through sustainable water users' organization (WUOs) in irrigation and drinking water supply and sanitation.

The Water Resources Management Policy paper was the product of a cross-sectoral effort involving staff from both the irrigation and drinking water and sanitation subsectors, and this volume has attempted to maintain the same tradition. Both subsectors face the common challenge of providing efficient and equitable services through state agencies weighed down by serious financial constraints. A number of institutional reforms, among them the promotion of user participation in the design and management of service delivery, are being attempted to meet the emerging challenges. The volume presents a common introduction that sets the stage for a detailed analysis of the subsectoral experiences.

We hope this will be one of many steps in improved communication on common themes between the two subsectors, and between them and others interested in the economic, environmental, and institutional sustainability of water services.



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ABSTRACT

This paper addresses the basic question: under what conditions are user organizations most effective in managing water systems? The first part examines the conditions under which sustainable water user associations (WUAs) can be fostered in the irrigation sector. The second part deals with water and sanitation users' associations (WASAs) in the domestic water supply and sanitation sector. Key external factors and internal structure for sustainable user associations, as well as conditions for partnership between the government agency and user associations are identified. Sustainable associations in irrigation require a supportive policy and legal environment, and strong incentives for farmers, with particular attention to financial viability. Well-defined roles, rights and responsibilities of the government and associations in water and system management and incentives for agency staff are also crucial for the success of WUAs. In the water supply and sanitation sector, the need for agency reorientation to deal with user interests is emphasized. Benefits from participation and specific roles of WASAs must be identified in the policy and institutional context of a country. Such roles could vary from pressure groups to means of improving the accountability of the public agency or even full control over system design and construction, and later management of services. Ultimately, the appropriate institutional arrangement between the government agency, the users, and their associations needs to be developed to meet the objective of improved and cost-effective water services.

ACKNOWLEDGMENTS

The authors of the WUA study are grateful to Masood Ahmad, Bhuvan Bhatnagar, Michael Cernea, Ariel Dinar, Gershon Feder, Francois Gadelle, Elsie Garfield, Vilma Horinkova, William Johnson, William Jones, Hyko Laeyendecker, Guy le Moigne, Joma Mohamadi, Van Tuu Nguyen, Keith Oblitas, Walter Ochs, Stan Peabody, Herve Plusquellec, Richard Reidinger, Mikitaro Shobayashi, Jose Simas, David Steeds, Sofia Valencia, Debbie Wolanski, Renato Gazmuri, Max Goldensohn, Peter Hazell, Alain de Janvry, Doug Merrey, Keijiro Otsuka, Mark Rosegrant, Mark Svendsen, and Doug Vermillion for their help and information. In addition, Richard Reidinger, Keith Oblitas, Jose Simas, David Steeds, Ariel Dinar, Bryan Bruns, Alain de Janvry, William Easter, Renato Gazmuri, Max Goldensohn, David Groenfeldt, Bob Hearne, Shashi Kolavalli, Max Lowdermilk, Doug Merrey, and Elinor Ostrom have provided valuable written comments on an earlier draft of this paper.

This WASA study is a joint product of the members of the Informal Institutions Group of the Transport, Water and Sanitation Division of the World Bank. The members are: John Briscoe, Mike Garn, Albert Wright, Brian Grover, Bruce Gross, Penelope Brook Cowen, Wendy Wakeman, Laurie Edwards in Washington DC, and Robert Boydell, Richard Pollard, Mary Judd from the East Asia-Pacific Regional Group; Rekha Dayal, K. Minnatullah, Panneer Selvam, K.S. Ramasubban, Ani Dasgupta from the South Asia Regional Group; Tore Lium, Mukami Kariuki from the East Africa Regional Group; Alain Mathys, Annie-Manou Savina, Eustache Ouayoro from the West Africa Regional Group; Jennifer Sara from the Bolivia Office. From the operational complex of the Bank, the comments received from Vicente Paqueo, Abel Mejia, Imogene Jensen, Geoffrey Read, Gerhard Tschannerl, Alexander E. Bakalian, Rita Klees, Hilary Cottam, Kim Cuenco, Xavier Legrain, Stuart Whitehead are gratefully acknowledged. Constructive comments were also received from the three outside reviewers, Messrs. Frank Hartvelt, Vinod Vyasulu and Ms. Susan S. Davis. Thanks to Messrs. Pouliquen and Pellegrini, former and current Director respectively of the Transport, Water and Sanitation Department for their support and encouragement.

Last but not the least thanks go out to Zakia Nekaien-Nowrouz and Rosemarie Poole for the painstaking task of bringing this manuscript to its final form.

ABBREVIATIONS AND ACRONYMS

| | |
|------------|---|
| BIADP | - Barind Integrated Area Development Project (Bangladesh) |
| DL | - Distributary/lateral |
| GTZ | - Gesellschaft für Technische Zusammenarbeiten (Germany) |
| HNG | - Hungnong Gae (South Korea) |
| IA | - Irrigator's Association (Philippines) |
| ICWE | - International Conference on Water and the Environment (conference held in Dublin, Ireland) |
| IDSS | - International Development Support Services (Indonesia) |
| IFPRI | - International Food Policy Research Institute (Washington, DC) |
| JNCICID | - Japanese National Committee of the International Commission on Irrigation and Drainage (Japan) |
| KfW | - Kreditanstalt für Wiederaufbau (Germany) |
| KWAHO | - Kenya Water for Health Organization |
| LP3ES | - Institute for Social and Economic Research, Education and Information (Indonesia) |
| MS | - Main system |
| NESPAK | - National Engineering Services Pakistan Limited (Pakistan) |
| NGO | - Non-governmental organization |
| NIA | - National Irrigation Administration (Philippines) |
| NIACONSULT | - a subsidiary corporation of NIA (Philippines) |
| O&M | - Operation and Maintenance |
| PRA | - Participatory Rural Appraisal |
| RB | - River basin |
| RRA | - Rapid Rural Appraisal |
| RWS | - Relative Water Supply |
| SAED | - Societe d'Aménagement et d'Exploitation des Terres du Delta du Fleuve (Senegal) |
| SIDA | - Swedish International Development Authority |
| SS | - Sub-system |
| UNDP | - United Nations Development Programme |
| WASA | - water and sanitation association |
| WC | - Watercourse |
| WUA | - water users' association |

EXECUTIVE SUMMARY

Water resource policy is undergoing a dramatic shift in many countries. Sectoral approaches, which deal with irrigation separately from water supply and sanitation, are being found inadequate in the face of increasing scarcity of fresh water and competition between uses and users. In two of the major water related subsectors, i.e. irrigation and water supply and sanitation, the emphasis on the state as the central actor in developing and managing water systems is giving way to a greater role for local users' organizations. Along with this shift, however, comes a need for information about how such organizations work and about the policy instruments that are most effective in helping them improve the performance and sustainability of water systems. In addition, understanding the potential strengths of users' organizations is insufficient without an awareness of their limitations and the types of outside intervention required. This paper reviews the theoretical literature as well as case materials on experiences with user organizations in both the irrigation and water supply and sanitation worldwide. It addresses the basic question: **under what conditions are user organizations most effective in managing water systems?**

This paper is divided in two parts: the first examines water users' associations (WUAs) in the irrigation sector, and the second deals with water and sanitation users' associations (WASAs) in the domestic water supply and sanitation sector. Both papers follow a similar approach, identifying the key external factors and internal structure which contribute to effective organizations. In neither case are users' organizations assumed to stand alone; thus, both studies examine ways to build constructive partnerships between users' organizations and state agencies. The final chapter of each section draws lessons for developing sustainable organizations for water resource management. The studies of WUAs and WASAs are presented in this volume with an overview section that elaborated on the common experiences of both subsectors.

WATER USERS' ASSOCIATIONS FOR IRRIGATION

WUAs can contribute to better performance of irrigation systems because of their advantages over a public agency on the one hand, and over uncoordinated activity by individual water users, on the other. This study reviews the limited evidence of the impact of WUAs in terms of improvements in water delivery services, system maintenance, area irrigated, agricultural productivity and incomes, reductions in environmental externalities, reductions in irrigation system costs, and contributions to social capital.

As an increasing number of countries implement programs of managed turnover and decentralization, assessment of impact will be a major area for study. Nevertheless, it is safe to say that one cannot expect WUAs to achieve sustainable levels of system performance by themselves. Along with the institutional structure of WUAs, a combination of appropriate technology; supportive state agencies and policies; and economic forces, including clear property rights and profitability of irrigation enterprises, is required for sustainable water users' associations, as well as for sustainable irrigation systems.

Drawing on insights from game theory and other literature to identify factors that enhance cooperation within WUAs, the study examines the internal conditions for effective WUAs, and related aspects of organizational structure: how the membership is defined, the size of the organizations, possibilities for federation, leadership roles, and the use of technical specialists. The study also discusses the effect of organizational history, including the age and origins of the WUAs.

Although the range of WUA organizations shows great variability, two broad models of WUAs can be identified. The first, the **Asian model**, typically relies on direct participation by all members. Base units are likely to be smaller and are often socially-based, multipurpose organizations that build upon members' daily interactions and knowledge of each other for decisionmaking, monitoring, and sanctioning. This model is likely to be most appropriate in socially cohesive societies with smaller landholdings, low market penetration, and simpler irrigation technology. The second, the **American model**, is a more specialized organization with role differentiation. The specialization, together with less reliance on face-to-face interactions, allows for larger organizational size. Membership is more likely to be based on hydraulic boundaries, and the organizations focus on irrigation rather than on multiple activities. Decisionmaking, monitoring, and sanctioning are based on formal rules and supervisory bodies. Such organizations are appropriate for situations of larger landholdings, greater market development, and more complex technology.

The concept of *sustainability* of WUAs does not mean that the organizations are unchanging. Indeed, change is often necessary for long-term viability. Nor does the concept imply that WUAs are necessarily *self-sustaining*, that is, that they can continue to exist without external inputs. The issue is not how to get organizations to function without any external assistance, but to identify what types of interactions and assistance are required for long-term viability, and how to create a facilitating framework for sustainable WUAs. State assistance and regulation should be seen as a continuing activity, even when WUAs take on a greater role in irrigation management.

More than any other single factor, the initial success and long-run sustainability of WUAs depends on sufficient incentives for farmers to participate. The benefits that members derive from the organizations must be greater than the additional costs farmers assume by actively participating in a WUA. The financial viability of WUAs is critical for the sustainability of the organizations themselves and the irrigation infrastructure. Legislation affecting WUAs must provide a facilitating framework, not a repressive one. This requires balancing farmer responsibilities with rights.

The state bureaucracy plays a continuing and important role in administering irrigation resources, even in cases where WUAs have achieved sovereignty over all aspects of irrigation management. A greater degree of agency control is generally found at higher levels of the system, with greater WUA role at lower levels. However, a clear definition of the responsibilities of each party and efforts to foster a collaborative working relationship are critical for any program to strengthen overall irrigation management. This requires ensuring that agency staff have proper incentives to work with farmers. The strongest and longest-lasting incentives for agency staff to work with WUAs follow from linking budgets to user fees, and staff compensation and rewards to

improvement in farmer services. In this way, complementarities between the capacities and roles of agencies and WUAs can be developed that benefit both the government and farmers.

Clear assignment of property rights over water and over the physical infrastructure of irrigation systems to WUAs can be a potent tool for strengthening the organizations, and should be given greater attention, particularly in programs whose objective is to transfer responsibilities and the costs of irrigation system management from the state to users. Although the appropriate role for the state changes as WUAs take on additional responsibilities, government support should continue, particularly in establishing and adjudicating water rights; monitoring and regulating externalities and third party effects of irrigation; maintaining a supportive legal framework for WUAs; providing technical and organizational training and support to WUAs; and occasionally providing design, construction, or financial support for major rehabilitation.

WATER SUPPLY AND SANITATION ASSOCIATIONS

The key message of the paper on water supply and sanitation associations (WASAs) is that there are no ready solutions or instant methods of promoting sustainable water and sanitation service delivery through WASA-type organizations. There are situations and contexts when WASAs are appropriate, but there are also cases where the institutional costs of operating through WASAs could be extremely high. A water and sanitation project manager planning to decentralize service provision and production through WASAs is thus best served by adopting a flexible 'doing and learning' approach, rather than following any blueprint or rigid guideline.

The four chapters in the WASA part of this report aim at presenting issues and concerns that either arise or need to be addressed if WASAs are chosen as the organizational arrangement for water and sanitation project targeting low income communities, by evaluating the past experiences in the sector. Chapter one discusses the internal determinants contributing to WASA success, noting that incentives for joint action are tempered by several institutional factors. While some of these are unique to each country, there are others that can be influenced by policy interventions. Chapter two focuses on the external determinants of WASA success, describing how economic, institutional and technology factors can either foster or hinder cooperation within WASA organizations. Chapter three describes the policy measures necessary if relationships between WASAs and sector agencies like water utilities are to be developed on a sustainable basis. Chapter four concludes with lessons for joint management, if WASAs are brought into water and sanitation provision and production.

The first conclusion is that working effectively with WASAs represents a substantially different way of doing business for the sector. For this to happen, the role of sector agencies must be reconfigured to match this new approach. Rather than focusing on construction, sector agencies need to become facilitators and organizers, taking on tasks for which they have a decided comparative advantage. In serving the poor, most of the difficult work involves not engineering design, but problem solving in collaboration with user groups, who are given increasing control over planning and managing their own services. What is required is working out rules through an iterative process so that WASA objectives match the individual objectives of its members; and the latter are able to participate in key investment and operational decisions.

The second conclusion is that devising the right type of WASA becomes specific to a country context; but a few key areas emerge where WASAs can help in sectoral decision-making. The areas where WASAs can help are in providing:

- a platform to discuss and negotiate individual preferences for the services, and match the collective demand with the appropriate service level option;
- a mechanism to work out financial contributions by members, pricing and cost recovery arrangements;
- a body with sufficient collective voice to interface with water utility organizations
- an overseeing agency for training, operations and maintenance

The third conclusion is that the most appropriate role for WASAs cannot be prescribed in advance; it has to evolve in a local context, depending on policies, conditions and institutions. A wide range of possible roles for WASAs exists, from acting only as a pressure group for accessing services or improving public agency accountability, to full control over design, construction, pricing, management and operation of water and sanitation services.

A fourth conclusion is that regardless of the extent of autonomous WASA management, there will be an ongoing role for government, and an expanded role for intermediary non-governmental organizations and small private firms. The task is not to discover how many responsibilities can be devolved to WASAs, but how to most effectively meet users' needs through institutional arrangements.

Part I

USER ORGANIZATIONS IN WATER SERVICES

**Ashok Subramanian
N. Vijay Jagannathan
Ruth Meinzen-Dick**

1. INTRODUCTION

In recent years development strategies have undergone a dramatic shift, with the emphasis changing from the state being the central actor toward greater participation by a variety of other actors, including local governments, nongovernmental organizations, and beneficiaries. The World Bank's (1993) paper on water resources management policy describes this shift and the new approach in this sector, which focuses on demand-led development of water services and decentralized management. While user organizations have been involved in deciding between investment priorities and managing local water resources on a small-scale for several decades, relatively little is known about how to apply their experience to large-scale projects, namely, those financed by national governments and multilateral donor agencies. This volume has come about because of the need for information on how such user organizations can be used to manage water resources at the lowest appropriate level and on the type of support they need to function effectively.

The irrigation sector and the drinking water supply and sanitation sector have traditionally been dealt with separately because of their different economic and social contexts. In the case of irrigation, for example, farmers' access to water increases farms' productivity, and thereby improves the prospects for income generation. In the case of water supply and sanitation, when consumers have safe and reliable access to water and sanitation services, they are protected from water-borne diseases and infections, their children are healthier, and women have to spend less time fetching water. In both cases welfare is increased, except that while irrigation water is a critical input for farmers' production of crops, safe drinking water and sanitation services are a basic human need and a social obligation of the modern welfare state.

Traditionally, these differences, rather than any similarities between the two sectors, have dictated the respective policy frameworks and delivery systems. Yet the similarities and parallels are striking. Both sectors have long shared the same general trends in development and management of infrastructure and now face similar problems. Following the infrastructure expansion of the last four decades, both sectors are currently experiencing common indicators of unsustainable services, namely:

- Dissatisfied users of services
- Unsatisfactory operations and maintenance of physical infrastructure
- Inadequate capacity to mobilize financial resources for future investment requirements.

The policy responses to these shared problems also resemble each other: a gradual shift over the years from reducing *physical* investment costs, operations, and maintenance costs of service delivery to one altering incentive structures in such a way as to lower the implicit *institutional* costs of delivering water services through large public organizations and utilities.

The principle under which institutional costs can be lowered, as summarized in the World Bank's (1993) paper, is not to manage at a higher administrative level what can be effectively managed at a lower level. Decentralizing the management of water services and having more flexible organizational arrangements lowers institutional costs significantly for reasons that are explained in this volume. While user organizations have a central role to play in such an arrangement, policy

issues arise in connection with when to encourage the involvement of user organizations and when not to. For example, user organizations do not always improve performance, nor do they arise naturally in all contexts. One must understand the conditions and factors that affect the creation, performance, and sustainability of user organizations, both for irrigation and for water supply and sanitation. Both studies in this volume provide analyses of when user organizations work and when they do not work.

PAST AND PRESENT STRATEGIES FOR PUBLIC INTERVENTION

A variety of public intervention strategies have been adopted in the past, falling broadly into two approaches. The first approach focused on technological aspects, while the second approach focused more on the institutional aspects. In both approaches the impacts on incentives for water service providers and service users to use services in a sustainable manner were often neglected.

Focus on Getting the Technology “Right”

Technological innovations have resulted in impressive gains in introducing cost-effective technologies for water users, in limiting inefficient and inequitable access to water, and in reducing recurrent costs of water services provision. A general observation worldwide for both the irrigation and the drinking water and sanitation sectors is that technology-driven innovations rarely succeed unless they conform to users’ needs, preferences, and willingness to pay. The reason is fairly obvious: without adequate user consultation, essential information on local conditions and local demand for the services is not factored in. As a result, services from these often expensive capital investments do not match local demand, and users view the services as neither reliable nor easily accessible. Over time a familiar story unfolds. Users refuse to pay for the services, public agencies complain about the lack of ownership by farmers and local residents, operations and maintenance are neglected, and expensive infrastructure begins to deteriorate prematurely.

Focus on Improving State Management

Could the situation be changed by improving public management of the infrastructure? State intervention has been justified by the lumpy capital investment requirements for water infrastructure. The assumption was that the state would not only have the capacity to mobilize capital, but also the motivation to achieve high performance standards and overcome externality problems. The rationale for state intervention was further reinforced by a perceived strategic importance of water in ensuring an affordable and secure food supply, in improving the health and productivity of water users, and in ensuring that the environmental impacts of water services were positive.

The impressive expansion of water infrastructure in most developing countries has been possible because of an almost total reliance on public financing. However, poor performance by many state-managed systems in operating and managing facilities has been common to both irrigation and water supply and sanitation systems. The centralized approach to water resource management has proven to be unsustainable because it has neglected incentives for users to participate in system funding and management and for service providers (that is, public sector employees) to provide services based

on what users want and are willing to pay for. Poorly adapted services have resulted in deteriorating structures, and the sustainability of water infrastructure for both irrigation and water supply/sewerage is in grave doubt in many countries.

PROBLEMS WITH PAST PUBLIC INTERVENTIONS

Water is a common pool resource, although services from this resource can be privately appropriated for production (as in the case of irrigation) and consumption (as in the case of water supply). Two common problems that have arisen during past public interventions relate to institutional costs and information problems.

When institutions do not have the capacity or the political backing to enforce laws and rules, outcomes are inefficient and inequitable. For example, irrigators with lands close to the headworks may channel extra water to their fields to the detriment of the farmers at the tail end of the distribution system. In the water and sanitation sector, a common sight is for public taps to be left open and unattended in one part of a city, while in another part low water pressure means that consumers have dry taps because the water utility is unable to enforce its rules because of political pressures.

These sorts of institutional inefficiencies reduce individuals' incentives to contribute to the provision and production of water services, and many are perceived to be taking a "free ride" on public resources. The combination of these two factors—nonexcludability and rivalry—gives rise to Hardin's (1968) "tragedy of the commons": privately optimal strategies followed by each irrigator or water supply user result in social costs, refusal of users to pay for services, and ultimately, rapid deterioration of infrastructure facilities because of the lack of maintenance. These outcomes leave everybody worse off, compared to a socially optimal situation in which all had contributed to the upkeep of the facilities.

Another common argument for public intervention in water services—the need to address poverty, food security, and public health problems—is often weakened if planning is undertaken with incomplete information. For example, irrigation is expected to negate the effects of periodic droughts and contribute to food security. However, a poorly designed system can create many new localized problems: waterlogging, soil salinization, and the spread of diseases. Similarly, drinking water and sanitation services are expected to have positive impacts on health and individual productivity. However, supplying water without a wastewater infrastructure could actually worsen sanitary conditions because most of the water consumed is also discharged as wastewater, which needs to be conveyed out of the neighborhood.

Policymakers have turned their attention to the potential of using water user groups to plan and manage water infrastructure because of the twin problems of the institutional costs of implementing water distribution rules and of planning and managing water infrastructure with incomplete information. The arguments advanced for supporting water user associations are that water users (whether for drinking water or sanitation) have far more complete information on local conditions, and must therefore be included in the planning and management process. Furthermore, water users

also have traditional norms and conventions that often may be far more effective than a top-down water bureaucracy in enforcing contracts among users of tertiary and secondary distribution systems.

In terms of planning and management of infrastructure, this implies a need to distinguish between a capital-intensive trunk system that would continue to be planned and managed by a water utility or an irrigation agency and a more participatively designed, financed, and managed feeder infrastructure, in which users have a voice in critical planning and management decisions. Water user groups can effectively perform a variety of functions in the latter, ranging from managing the irrigation channels and water and sewerage networks in their neighborhoods to deciding where facilities should be located, collecting tariffs, determining service levels, and so on. Clearly, the role of these groups would depend on how broadly or narrowly their tasks were defined.

HOW CAN USER ORGANIZATIONS HELP IN BETTER PLANNING AND MANAGEMENT?

Could water rights be privatized to individuals and communities instead of being owned and managed by state agencies lead to better solutions? Privatization experiences varies considerably between the water supply and sanitation and the irrigation sectors. In the water supply and sanitation sector several institutional options are available to privatize parts of water production and distribution systems, or even entire systems. Incentives already exists, as demonstrated by the many people not served by water utilities who pay between ten to a thousand times as much for a unit of water than others served by utilities. The evidence is not as persuasive in the irrigation sector. While privatized small-scale irrigation systems are evident in many countries, the existence of market failures calls for strong regulatory institutions. Principal among the market failures is the presence of externalities caused by unsustainable use of water, such as excessive drawdown of aquifers. Private sector development is also affected when the supply of irrigated water is highly variable and/or systems are complex, which makes drawing up contracts to cover all contingencies difficult. The strategic and political importance of irrigation water in providing a stable food supply and the absence of insurance or credit mechanisms to safeguard against drought and other natural and manmade disasters aggravate the effect of missing contingent markets. Finally, the technical and administrative costs of getting many small users to pay water charges/tariffs are too high unless a local organization is able to internalize these costs within the community. An observable trend in many Asian countries is for the water utility/agency to focus on recovering costs from the community as a whole, rather from each individual user.

However, even in cases where markets are not efficient, the devolution of management to local user associations could create a surrogate market and lead to efficiency gains and other benefits. User organizations can be a substitute for markets in terms of improving the flow of information and helping to identify appropriate institutional arrangements to reduce local conflicts and match services to local demand.

User organizations can help achieve better performance by water service systems because of their advantages over public agencies on the one hand, and their advantages over uncoordinated individual activity on the other. Users have better information about the water needs and actions of other users, thereby allowing them to monitor services more effectively and to enforce water management

appropriate to a local or feeder area. When users are responsible for deciding how to organize operations and maintenance and who will perform this work, a built-in mechanism to address the twin problems of the institutional costs of enforcement and the lack of adequate local information becomes available. A greater stake in the service and better information on local needs allow user organizations to gear the services to demand.

Reductions in system costs are also possible when user organizations are involved in the design of infrastructure. With the fiscal crises evident in most developing countries, subsidies for water infrastructure are becoming increasingly difficult to sustain, and users are required to bear a greater share of the responsibility, at the very least for system operation and maintenance. The evidence indicates that when rules are based on the principles laid out in the World Bank's (1993) paper on water resources policy, the outcomes are impressive. In one such effort, Brazil's water and sanitation project for low income communities (known by its Portuguese acronym PROSANEAR), for example, user participation led to the investment costs for sewerage being halved for about a million beneficiaries.

Finally, user organizations facilitate the attainment of social goals such as democratization and the empowerment of women, as they provide an organized forum for expressing users' common interests. These organizations also have the potential to increase an area's "organizational density," which increases the likelihood that other types of voluntary local organizations will emerge. As individuals gain experience with cooperation, they build trust among themselves, which makes it easier to achieve cooperation in other spheres of activity. The effects of such social capital, while difficult to measure, are nonetheless a significant benefit.

To sum up, the premise for focusing on the factors that contribute to strong user organizations is the concept that strong and sustainable institutions will be better able to improve the performance of water service systems. However, local organizations do not exist in a vacuum, nor can government policies alone decree their existence. Rather, the structure and functioning of local organizations are greatly influenced by a set of internal factors (for instance, membership and size) and the external environment (policies, technology, and socioeconomic features) in which they operate. The following chapters discuss these internal and external determinants of the success of water user organizations.

ORGANIZATION OF THE VOLUME

This volume examines the empirical evidence in the irrigation and drinking water supply and sanitation sectors and investigates the conditions that give rise to effective local user organizations. While the studies follow the same analytical framework, each of the sectoral assessments was developed differently. The chapter on irrigation places greater emphasis on a review of both the theoretical and empirical literature and elaborates on the analytical framework. By contrast, the chapter on the water and sanitation sector focuses on involving users in the planning and design of feeder networks, because experience with large-scale, user-managed water supply or sewerage systems is limited.

Part II

**SUSTAINABLE WATER USER ASSOCIATIONS:
LESSONS FROM A LITERATURE REVIEW**

**Ruth Meinzen-Dick
Meyra Mendoza
Loic Sadoulet
Ghada Abiad-Shields
Ashok Subramanian**

1. INTRODUCTION

In many countries irrigation development policy has undergone a dramatic shift during the past five years. A search for local users' organizations to take on a greater role is replacing the former emphasis on the state as the central actor in developing and managing irrigation systems. Along with this shift, however, comes a need for information on how such organizations work and on the policy instruments that are most effective in assisting local organizations. This study reviews experiences with irrigation water users' associations (WUAs) in an attempt to identify the internal principles and external policies that facilitate effective performance by such organizations.

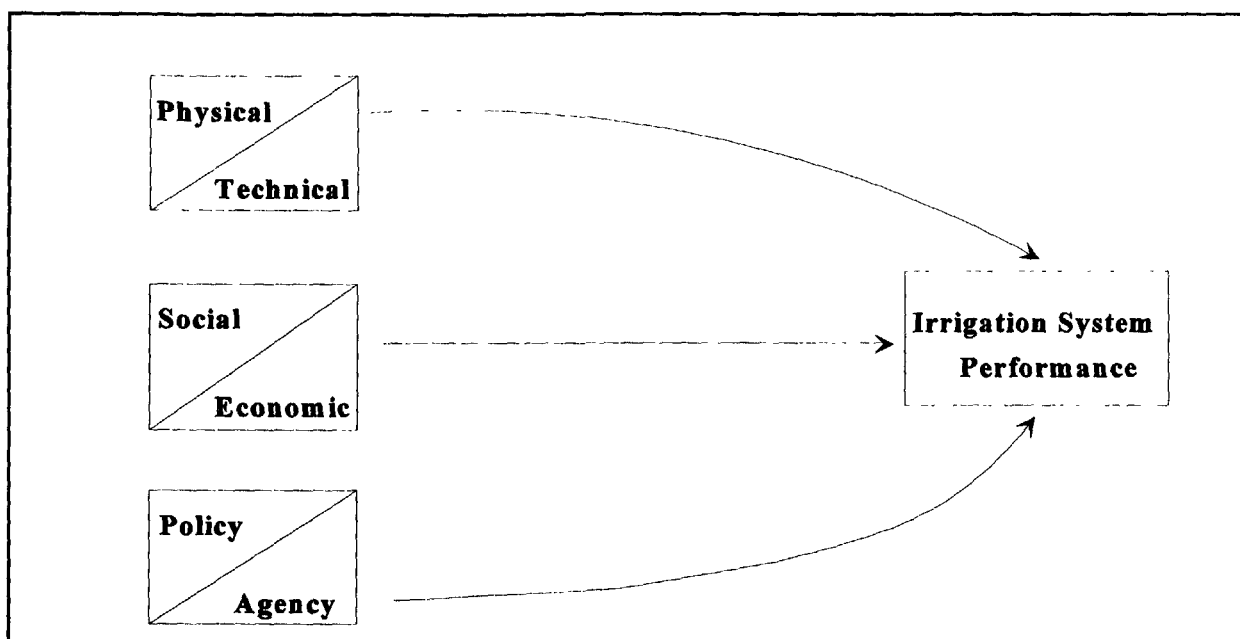
This study uses the term water users association as a generic term for an organized group of irrigators with some involvement in irrigation management. It includes both formal and informal organizations, and traditional organizations as well as those that have arisen through some form of project involvement. While Water Users' Association may refer to a specific legal entity or type of formal organization in some countries, for example, Pakistan, this paper uses the term to include a wide variety of organizations that go by a number of names. For example, in Mexico these entities are referred to as Water Users' Organizations because organizations have a stronger legal standing than associations.

Along with the pressures to decentralize and transfer the management of irrigation systems from government agencies to local organizations in many countries comes a need to understand the factors that contribute to the success of WUAs. Such an understanding is necessary if management transfers are to succeed in improving the performance and sustainability of irrigation systems. Understanding the potential strengths of WUAs is insufficient, however, without also addressing the limitations of organized user groups and the contexts in which outside intervention is required. The purpose of this paper is to review the theoretical literature and case materials on experience with WUA development and management transfers worldwide to address the question: **under what conditions are WUAs most effective in irrigation management?**

IMPETUS FOR STUDYING WUAS

Earlier approaches to irrigation development have tended to emphasize the technology of the systems, the market and economic structures in which they operate, and the government agencies managing the systems. These approaches were based on the assumption that a combination of "correct" technology, "efficient" markets, and "capable" agencies would yield result in the best performance. Figure 1-1 shows this view of irrigation system operation. Examples of irrigation systems that are performing well, for example, in Malaysia, demonstrate that good performance under state management is possible. However, the prevalence of technological, market, and agency failures and the ensuing poor performance of irrigation systems have shown that in most cases the combination of technology, markets, and agencies has often not sufficed to provide effective irrigation services.

Figure 1-1. Simplistic View of Factors that Affect the Performance of Irrigation Systems



Many irrigation projects have been based on introducing technological innovations to improve system efficiency. Examples include lining canals to reduce transmission losses, installing proportioning devices, or even introducing telephones and management information systems. Yet without proper management, such innovations fail to deliver the desired irrigation services, and systems soon deteriorate for lack of proper operation and maintenance (O&M).

Counties have generally entrusted the management of their irrigation systems to government agencies, on the assumption that they will have the capacity and motivation to achieve high performance standards.¹ Heavy state involvement in irrigation has been justified based on the public goods characteristics of irrigation, notably the positive and negative externalities, strategic

1. We use agency in this study to refer to any government organization involved in irrigation management, for example, an irrigation department, public works department, or water resources department. Parastatal agencies and semi-autonomous agencies, for instance, Zimbabwe's Agricultural and Rural Development Authority, the Philippines' National Irrigation Administration, New Zealand's Ministry of Works and Development, also fall under this heading.

importance, and scale of systems (World Bank 1993). In practice, state agencies cannot be omniscient and omnipotent, particularly in dealing with problems at the local level. Moreover, the private incentives of agency staff are often at odds with official objectives in irrigation management, leading to rent-seeking behavior. The result has been suboptimal levels of system performance.

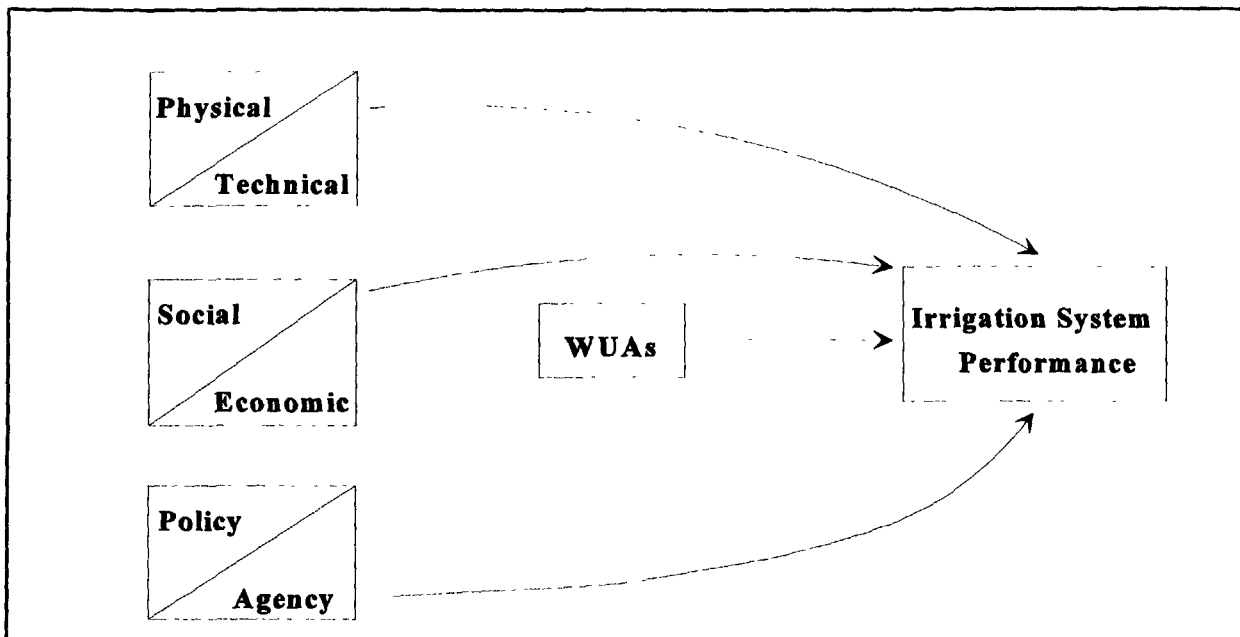
As irrigation systems have expanded, attention to the performance deficiencies of many government-managed irrigation systems has increased. This includes an examination of the failure to achieve project objectives in terms of area irrigated and yield increases, and the failure to operate and maintain systems adequately, which has led to disrepair and a need for further investment in rehabilitation. In view of the low level of irrigation charges and the low fee recovery rates from farmers, the financial burden of subsidizing agencies to manage the systems has become more serious for many governments. Combined with donor pressures and the fiscal crises of the state, governments can no longer maintain subsidies for irrigation systems that perform suboptimally. However, simply raising irrigation charges is politically unpopular, and does not provide the necessary incentives for agencies or farmers to improve irrigation system performance.

The traditional economic solution of "getting the prices right" has been difficult to implement and of limited use in improving irrigation system performance. The World Bank's (1993) policy paper on water resource management recommends opportunity cost pricing to improve incentives for performance, but recognizes that this may not be immediately feasible in many situations, and that its application will have to be carefully sequenced. Market solutions, such as tradable property rights, are being explored by policymakers and analysts, but the difficulties of specifying clear and enforceable property rights and the presences of high transaction costs and positive and negative externalities, along with other types of market failures in irrigation systems, have limited the effectiveness of this strategy. Therefore, institutional reforms to reduce costs while improving incentives for better performance of irrigation systems are essential.

The potential contributions of local WUAs have received increasing attention as the limitations of technological, economic, or government solutions for achieving acceptable performance by irrigation systems have become apparent. Figure 1-2 shows how local management, such as by WUAs, can supplement technological, economic, and government forces in improving irrigation systems. Obviously, in this context strong organizations will have a greater impact than weak or nominal organizations not only on the physical performance of irrigation systems, but also on their financial performance, on the success of decentralization, and on meeting social objectives.

Since the late 1970s an increasing number of field studies of farmer-managed irrigation systems has suggested that government management is not the only (nor even always the best) option for irrigation. During the 1980s some projects tried to stimulate the development of WUAs, even within the command areas of government-managed irrigation systems, for example, in Pakistan, the Philippines, and Sri Lanka. Reported successes, especially in the Philippines, led to more widespread policies of transferring irrigation system management from government agencies to local organizations. The International Irrigation Management Institute has studied management transfer programs. These studies and other country experiences were presented at the International Conference on Irrigation Management Transfer, held in Wuhan, China, on September 20-24, 1994.

Figure 1-2. WUAs Contributing to Irrigation System Performance



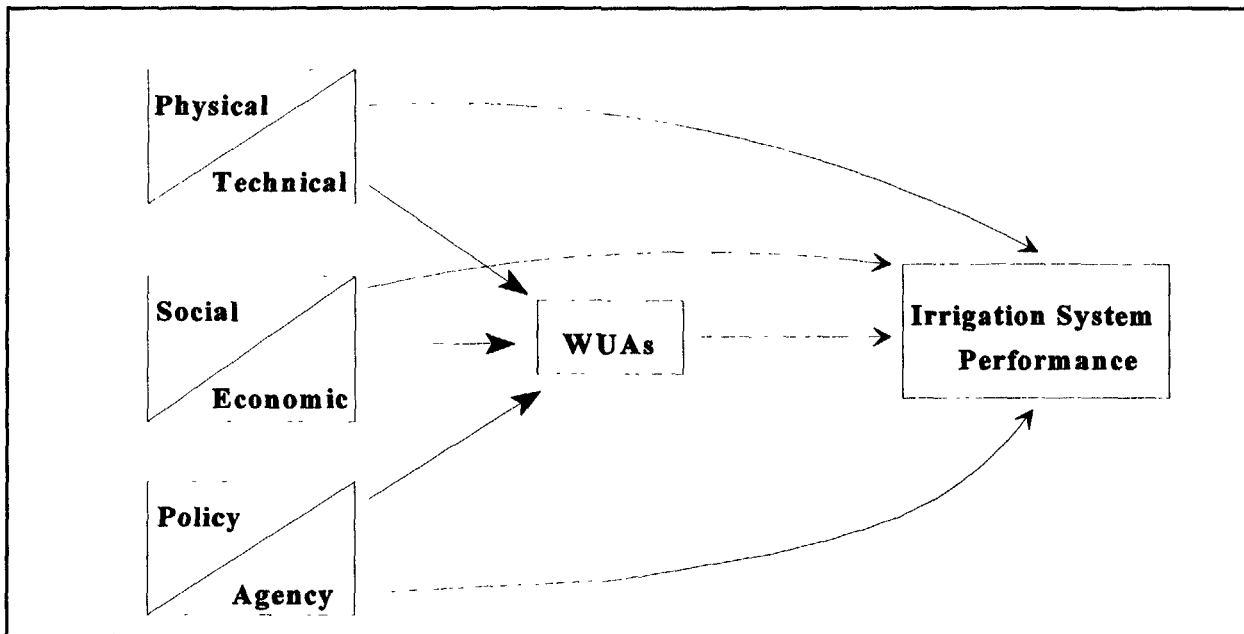
Investigators have demonstrated that the establishment and active participation of WUAs in irrigation management improves the performance and sustainability of irrigation systems in a number of ways. Appendix 1 reviews the evidence on the benefits of WUAs in various countries. More efficient water delivery services and the design and construction of irrigation projects better adapted to local needs and constraints are benefits derived from increased involvement by farmers. Other quantifiable and widely cited gains include expansions in the areas irrigated, increased crop productivity, and higher farm incomes. The reduced financial burden on the state has been one of the easiest outcomes to document and receives considerable attention in the literature. Recently, some of the literature (for example, ICWE 1992; World Bank 1993) has begun to refer to reduced adverse environmental effects as a criterion of success, although few studies have provided evidence on this to date.

FRAMEWORK FOR THE STUDY

Although investigators have shown that WUAs improve the performance of irrigation systems, WUAs are not found everywhere, or they may be too weak to have a positive impact on performance. Furthermore, WUAs do not operate in a vacuum. Understanding the factors that affect the operation of WUAs requires attention to both their internal structure and the external factors that condition their operation, as shown in Figure 1-3 which illustrates the conceptual framework of this study. WUAs have a direct impact on the performance of irrigation systems, along with technical,

economic, and government forces, but external factors also affect the structure and functioning of WUAs. The factors that need to be examined include (a) the physical and technical aspects of the irrigation systems (b) the social and economic contexts in which they operate and (c) the government and policy forces (including irrigation agencies) that regulate the WUAs and the irrigation systems. Because cases of pure WUA management (without state regulation) or pure state management (without user involvement) are relatively rare, this study examines the range of options for joint management.

Figure 1-3. Factors that Affect the Role of WUAs in Irrigation System Performance



The growing body of literature on common pool resource management provides a strong basis for examining the potential for local management of irrigation resources through water users' associations. These studies have cut across resource types to include forests, fisheries, grazing lands, and irrigation. Fundamental to all of these is the issue of how to ensure sustainable management of the resource base.

The work of Ostrom (1992a, b) and Tang (1992) has been particularly valuable in identifying factors that contribute to effective self-managed irrigation systems, focusing on the physical attributes of systems, the attributes of the community of users, and rules or institutional arrangements. Ostrom's (1992a) "design principles of long-enduring, self-organized irrigation systems" include clearly defined boundaries; proportional equivalence between benefits and costs; collective choice arrangements, that is, users' ability to set and modify rules; monitoring; graduated sanctions; conflict resolution mechanisms; at least minimal recognition of rights to organize; and nested enterprises, namely, federations.

This study draws insights from game theory and other literature to identify factors that enhance cooperation within WUAs. In examining the internal conditions for effective WUAs, it reviews several key aspects of organizational structure: how the membership is defined, the size of the organizations, the possibilities for federation, the leadership roles, and the hiring of technical specialists. It also discusses the effect of organizational history, including WUAs, age and origins. However, this study does not deal extensively with *how* WUAs can be developed, as this is discussed in more detail in Meinzen-Dick, Reidinger, and Manzardo (1995).

This study used the following sources to identify factors that affect the performance of water users' associations: the theoretical literature, empirical case studies of WUAs, other studies of WUAs, irrigation project documents, and discussions with those engaged in WUA-related projects or research. We derived key principles by fitting empirical examples and practitioners' insights into a theoretical framework. We selected items from the large number of WUA case studies available with an eye for recent studies with broad geographic coverage, including both developing and industrialized countries. Project documents provide information on emerging experiences, particularly concerning joint management and transfer programs involving WUAs. Appendix 2 lists the countries included in the study. Other synthesis studies (notably Cernea and Meinzen-Dick 1992; Goldensohn and others 1994; Hunt 1989; Meinzen-Dick, Reidinger, and Manzardo 1995; Ostrom 1992a; Tang 1992; Uphoff 1986; Uphoff, Meinzen-Dick, and St. Julien 1985) expand the range of cases and insights on which this paper builds. Discussions with knowledgeable professionals within the World Bank and other institutions have provided information on the most recent developments in countries and perspectives on WUA development.

The study's concern with how to create and sustain WUAs for irrigation system management leads to a focus the effect of external forces on WUAs. In addition to the variables identified by Ostrom (1992b) and Tang (1992), we include a more explicit examination of the effects of the economic and policy environment in which WUAs operate, which affect both of individuals incentives and the structure of the organizations.

This does not imply that we can use a blueprint approach to develop a standard WUA for a country or region. Indeed, this would be counterproductive, because no organizational form is suitable for all conditions. Rather, this study seeks to identify critical factors that should be taken into account for appropriate WUA adaptation to differing environments.

2. EXAMINING THE NEED FOR WUAS

Earlier approaches to irrigation development were based on the belief that a certain set of conditions could result in optimal performance of irrigation systems. However, the evidence of technological, policy, and market failures in the management of irrigation systems is widespread, that is, the links in figure 1-1 are flawed. A traditional approach has been to try to bridge the gaps in the links with government intervention. Nevertheless, local information constraints and inappropriate incentives for government employees have generally led to ineffective management by state irrigation agencies. While a legitimate and continuing role for the state nonetheless exists, local cooperation mechanisms like WUAs have advantages in certain aspects of common pool resource management. This chapter develops this argument in more detail and provides some evidence about possible positive impacts of WUAs.

THE NATURE OF THE RESOURCE AND EXTERNALITIES

The successful management of irrigation systems must address two major issues: the allocation of irrigation water (the assignment of water rights and contingency of delivery) and its provision (the physical distribution). The optimal use of an irrigation system over time entails a combination of the efficient management of the flow of water it produces and the regular maintenance of the facilities that provide that flow.

However, water is a common pool resource. Individual members are hard to exclude from use of the water available to the group, and the different users of water compete with each other. This *nonexcludability* stems from the high costs of developing and implementing means of individual regulation, while the *rivalry* arises because the consumption of a unit of the good by one individual makes it unavailable to others. The difficulty of exclusion reduces individual irrigators' incentives to contribute to the provision of the resource, because noncontributors benefit equally from the flow without incurring the costs of provision. Furthermore, the rival aspect of water resources and their common pool nature allows free riders to sustain only a fraction of the social cost of their actions, thus producing an externality that results in inefficient use of the resource. It is the combination of these two factors—nonexcludability and rivalry—that results in Hardin's (1968) "tragedy of the commons": rational action on the part of each irrigator brings about the inefficient use of irrigation water and the depreciation of the provision facilities from the lack of maintenance; an outcome that leaves everybody worse off than if they had all contributed to full maintenance.

Irrigation systems also produce other negative externalities. These can be localized, such as the waterlogging and salinization of soils and the spread of diseases, or on a larger scale, like the erosion created by the construction of a new main system or migration into the area (World Bank 1993). Positive externalities also exist, like the effects of producing a self-sufficient, stable food supply for the region.

TECHNICAL SOLUTIONS AND FAILURES

A common response to these problems has been to introduce technological "fixes." For example, building permanent headworks to replace structures that need to be replaced every year reduces the recurrent costs of providing irrigation services; lining canals or using buried pipe reduces the amount of maintenance required, makes restricting access to water easier, and can reduce waterlogging; installing fixed outlets (such as *pukka nukkas* in Pakistan) and proportioning weirs attempts to limit water use to authorized amounts; putting in structured systems, which are designed to be self-regulating, and have no gates or other facilities that need to be adjusted below a certain point in the system, reduces both the costs of system operation and the scope for excessive water use by any part of the system; and constructing reservoirs increases the stability of water supplies.

Unfortunately, many projects have incorporated engineering interventions without adequate consultation with local users, and project designers therefore lacked essential information about local conditions and needs. The result has often been structures that did not function as intended. Furthermore, without adequate maintenance, even improved infrastructure will deteriorate, and without adequate monitoring, even improved structures are not proof against users extracting too much water.

INEFFECTIVE STATE MANAGEMENT: THE NEED FOR LOCAL COOPERATION

Governments have long justified a strong role for the state by the need to regulate common pool resources and manage irrigation technology. The argument is reinforced by the natural monopoly characteristics and the positive and negative externalities associated with irrigation water. The creation of irrigation facilities requires large and indivisible investment costs, creating a natural monopoly situation that a state agency can fill. In addition, the strategic importance of water in ensuring a cheap and secure food supply, as well as the environmental impacts of irrigation, are externalities that are too widespread for users internalized. Externalities caused by the subtractability of water might require state intervention to protect certain populations from being deprived of any source of water. Moreover, governments have assured that the scale and technological complexity of many irrigation systems require state intervention to manage them. In many developing countries, the state has thus designed, constructed, and operated irrigation systems.

The poor performance of many state-managed irrigation systems has not validated these assumptions in practice. States have relied on a centralized approach to resource management while ignoring private incentives to both farmers and public employees. Poorly adapted services have resulted in deteriorating structures and systems that have not been sustainable over time (Chambers 1988). Government agents have little expertise in and information about local resources or actions and inadequate enforcement power, or at least much less than the local population does. Local appropriators will tend to have a higher capacity to observe other group members' actions and have access to various social networks and reciprocal relationships to develop and enforce rules (Tang 1994). Government agents will also have less of stake in creating a successful system, and may be more interested in devising systems to maximize their private rents rather than to achieve optimal efficiency or equity in the systems (Wade 1994). With fewer incentives for efficient performance

and more information constraints than the local population, government agencies have, in general, fewer comparative advantages in managing irrigation systems at a local level thereby, creating role for local participation and cooperation in managing successful systems.

This has led some analysts to propose the privatization of the commons to individuals or communities instead of state ownership. These analysts contend that privatizing the resource would result in excludability and an internalization of the externalities, and allow market forces to achieve more efficient irrigation systems. However, while property rights might be necessary for efficient management of the commons, they are insufficient, because they do not guarantee that allocation and provision markets will operate and be efficient.

MARKET FAILURES AND THE NEED FOR COORDINATION

For markets to yield an efficient outcome, there must not only be property rights that allow for the internalization of all externalities, but perfect and competitive markets and zero enforcement costs are also necessary. However, the nature of irrigation water resources creates numerous sources of market failures (World Bank 1993).

First, the variability of water supply and the complexity of systems would challenge *perfectness of the markets*, making it impossible to draw up contracts for all contingencies. The strategic importance of water in providing a stable food supply and the absence of insurance or credit mechanisms in case of drought, mismanagement, or other disasters aggravate the lack of contingent markets by limiting the amount of investments undertaken, instilling an even more suboptimal use of water. Furthermore, losses in transportation and the general intolerance of agriculture to underwatering make for indivisibilities in water demand, constraining the operation of the markets for irrigation water.

Second, the large, indivisible investments required to construct irrigation systems thwart *competition* in irrigation water markets, thereby creating a natural monopoly environment for irrigation water management. Moreover, the geographical advantage of upstream farmers over downstream farmers in obtaining access to water creates an asymmetry in market power by essentially giving upstream landholders control over the water supply to downstream farmers (Ostrom and Gardner 1993). Such characteristics make it difficult for irrigation systems either to be created or to be managed competitively.

Lastly, market transactions involve *substantial monitoring and enforcement costs*, imposed, for example, by the informational problems among irrigators, which restrict the effectiveness of decentralized markets for irrigation systems management. As a consequence, nonmarket processes that rely on the coordination of individual actions to maintain and distribute the water resources are required for successful management of an irrigation system, even with properly defined property rights that would internalize all externalities.

Some of these constraints are now being addressed in pilot projects testing the scope of water markets. Indeed, even in cases where markets are not efficient, a market solution may be a more

efficient allocative mechanism than state management. Whether a well-functioning market exists or not, the devolution of management to WUAs may have efficiency gains and benefits. WUAs can be a substitute for markets when they fail and an important institution in regulating conflict in a market system (Rosegrant and Binswanger 1994). Thus in some cases, communal management may be complementary, and even necessary, with market solutions.

HIGH TRANSACTIONS COSTS IN COORDINATION AND THE NEED FOR INSTITUTIONALIZATION

The decentralized coordination of actions among a group of individuals is a process that carries substantial transaction costs. Irrigation water users must negotiate with all other users to determine behavior that will achieve the best outcome. When these transactions costs are high enough, a coordination failure can ensue despite wide recognition of the possible benefits of successful coordination (see, for example, Baland and Platteau 1994). Institutions provide a structured bargaining forum that reduces the costs of coordination compared to what they would be in an institution-free world (North 1990, p.182). Transaction costs can be reduced by instituting a decision rule for the adoption of regulations, thereby reducing negotiation costs, (for example, decision by majority of votes versus decision by consensus; by establishing rules that are simpler and thus less costly to design and enforce, though possibly less efficient; and by using economies of scale in monitoring and sanctioning.¹

Formal organization has the additional benefit of increasing the individual members' bargaining power with outside groups. Negotiations with exterior parties carry more weight when done by an association than by the individual members because the association represents a larger economic force, legitimized by formalization. Institutionalization can thus improve the prospects of irrigation water management by reducing the transaction costs of coordinating behavior within and outside the group, thereby yielding more efficient outcomes.

1. Coordination of actions because of the lack of markets requires agents to bargain strategically to achieve an equilibrium. Because of incomplete information about the value of water to other irrigators and imperfect information about other irrigators' actions, irrigators must undertake some costs to try to gain more information in order to raise the efficiency of allocation. A simple rule mandating the distribution of water would render information gathering unnecessary, thus saving costs. Creating rules for the establishment of allocation and provision rules can save on negotiations costs too. For example, a decision by consensus requires all parties concerned by the rule to agree, whereas a majority vote only requires 50 percent of the parties to agree. Behavior must then be monitored to ensure that the rules are followed. In the case of decentralized contracts, each party must monitor its contract; in the case of rules, monitoring responsibilities are more easily performed and can be delegated to a specialized monitor, such as a ditch-rider.

BENEFITS OF WUAS

Investigators have shown that WUAs have a positive impact on the performance of irrigation systems in many countries and situations. Although the effects of WUAs have not been studied consistently, nor have their effects been separated from the impact of other changes in irrigation systems (for example, rehabilitation of structures), there is mounting evidence of improvements in irrigation services, agricultural productivity, system financing, and environmental impacts that can be attributed to WUAs. Appendix 1 reviews this evidence.

WUAs can contribute to better irrigation system performance because of their advantages over a public agency, on the one hand, and over uncoordinated activity by individuals, on the other. **Water delivery services** improve because farmers have stronger incentives to distribute the water and better information about irrigation needs. This permits more flexible allocation patterns and more careful monitoring of actual deliveries. **System maintenance** improves when WUAs have a greater stake in the systems. Farmer members are more likely to monitor the condition of irrigation structures and less likely to damage them if the WUAs must bear the costs of repairs. **Expansion of the area irrigated** is possible with improved irrigation services, water conservation, and negotiations between head and tailenders within WUAs. **Increases in agricultural productivity and incomes** derive not so much from the WUAs themselves (unless they also take on other functions such as marketing of inputs or outputs), but from the improvements in irrigation services and the increase in area irrigated. **Reduced negative environmental externalities** similarly result from improved irrigation services under WUA management.

The costs of irrigation systems can be reduced as WUAs take over responsibilities for irrigation service provision that government agencies formerly carried out. This results from reductions in government staffing needs, cost-saving project designs, increases in fee collection, and reduced destruction of facilities. This benefit of WUA development has received the greatest attention. However, the emphasis has been on government cost savings and increased revenues. In practice, the costs farmers bear usually increase under WUA management, because the government removes state subsidies for agencies and users are required to bear a greater share of the responsibility for system O&M. WUA management can achieve overall efficiency gains because of better local supervision and lower salaries and fringe benefits for irrigation personnel. However, the total monetary and transactions costs borne by farmers must be carefully assessed to determine the financial viability of WUAs.

WUAs facilitate such social goals as democratization and empowerment because they provide an organized forum for the expression of farmers, common interests. Strong WUAs also increase "organizational density," which increases the likelihood that other types of voluntary local organizations will emerge (Cernea 1993). As individuals gain experience with cooperation, they build trust among themselves, which makes it easier to achieve cooperation in other spheres of activity. The effects of such social capital, while difficult to measure, are nonetheless a significant benefit.

THE NEED FOR AN INTEGRATED APPROACH

Just as technology, agencies, and markets alone generally fail to result in a high level of performance from irrigation systems, so one cannot expect WUAs to achieve acceptable and sustainable levels of system performance by themselves. Along with the institutional structure of WUAs, a combination of appropriate technology; supportive state agencies and policies; and positive economic forces, including clear property rights and profitability of irrigation enterprises, is required for sustainable water users' associations, as well as for sustainable irrigation systems.² The following chapters discuss each of these components and their impact on WUAs.

2. Vermillion (1994) identifies four vital elements for effective irrigation management: (a) clear and sustainable water rights, (b) irrigation infrastructure compatible with the water right and with local management capacities, (c) clear and recognized responsibilities and authority, adequate financial and human resources, and (d) accountability and incentives for the managing entities.

3. INTERNAL STRUCTURE FOR EFFECTIVE WUAS

The growing evidence of voluntary cooperation in many common pool resource systems has recently helped abate the traditional fear that the tragedy of the commons will emerge from locally managed systems. The predicament has now become how to maximize the impact of WUAs in improving irrigation performance (see figure 1-2).

A review of numerous case studies has produced a "grounded theory" of common pool resource management, drawing on factors that the authors of the case studies have suggested contribute to effective resource management organizations (for example, Bromley 1992; National Academy of Science 1986; Tang 1992). This has led to a re-assessment of the organizational and incentive structure for local involvement in irrigation management. The purpose of this chapter is to review the theoretical literature on cooperation mechanisms, summarize the principles for viable WUA organizational structure, and present information on the norms and ranges of possibilities for WUA organizations. We start by summarizing certain issues addressed in the theoretical literature, and then "ground" the arguments in the empirical literature. This interaction between case studies and game theory has been a fruitful one, with game theory stressing the importance of individual incentives in creating and sustaining cooperation mechanisms, and the empirical cases enriching the game theory by showing how interactions among individuals, social norms, and the structure of organizations themselves can change individual behavior to increase cooperation.

CREATING AND SUSTAINING WUAS: DETERMINANTS OF COOPERATION

While early efforts assumed that cooperation was entirely engendered by altruistic motives, the evidence indicates that individual maximization by self-interested individuals also provides some strong incentives for sustaining cooperative arrangements (see references in Fafchamps 1991). In searching for explanations on how voluntary cooperation might emerge in the management of common pool resources, some authors (for example, Baland and Platteau 1994; Bardhan 1993a; Fafchamps 1991; Ostrom 1992a; Tang 1992) have drawn on game theory literature for insights on the conditions necessary for cooperative outcomes to occur. The result has been a move away from simplistic, static models such as the Prisoner's Dilemma Game and from their conclusions that cooperation is not viable, toward much richer paradigms. These include various combinations of different game structures, repeated games, as well as analysis of the roles of risk, information, beliefs, and norms. The results that emerge are quite different from the grim results of the common pool resource literature, and yield important guidelines how to create conditions that will foster cooperative outcomes through policies affecting the payoff matrices, sequencing decisionmaking, addressing the time dimension, lowering discount factors, and so on.

One of the important conclusions drawn from the theoretical literature concerns the critical role of education and leadership. The successful emergence of cooperation requires that the benefits of cooperation be well understood. An irrigator will only join in a cooperative arrangement if it appears likely to be profitable over time (individual rationality). In practice, the benefits of cooperation and the impact of individual actions on the common pool of natural resources seem to be often misunderstood. Another possibility is that a critical mass of optimistic cooperators might be needed

to launch successful cooperation (Baland and Platteau 1994). This emphasizes the importance of leadership and education (local or external) to reduce the costs of interaction and organization and act as a catalyst for the emergence of cooperation. Seabright (1994) also shows that the success of cooperative actions in the past affects the degree of confidence and trust in cooperative outcomes in the future. Consequently, *collective* training and experience has an important role in cooperation. New organizations should be tailored along the lines of others that have successfully promoted cooperation in the past. An overlap in membership between a new group and one that has cooperated successfully might be sufficient to engender *trust*, while retaining the benefit of small group size.

Another important issue the literature also addresses is the topic of sustainability. In particular, the incentives to sustain cooperation are stronger when the relative benefits of cooperation are large compared to the situation if the cooperative arrangement breaks down. This suggests that efforts at fostering cooperation can have varying degrees of success according to the environment in which they take place. Cooperation is easiest when discount factors are low, suggesting that policies should aim at lowering discount factors. In particular, high discount factors are related to credit market failures. A person completely unconstrained as concerns credit should have a discount factor that is inferior or equal to the interest rate. Uncertain property rights can also have the same effect.

Group size presents a tradeoff between potential economies of scale and increases in transaction costs. Because of the large fixed costs associated with irrigation facilities, the average cost per farmer of producing irrigation water can decrease with group size. Thus groups have incentives to be above a critical size. However, with the increase in group size comes an increase in transaction costs and a possible decrease in expected benefits from cooperation. First, increases in group size reduce observability and punishment capacity. Larger groups increase anonymity, which decreases the possibility of "rough mental accounts" (Ellickson, as quoted in Baland and Platteau 1994) in relationships as these become less important. It also gives less incentive to invest in building a good reputation. Community ties also become weaker, and thus social pressure might diminish, as might the possibility of punishment through interlinkages between people. Second, larger groups also make it harder for irrigators to observe the effects of their actions. A single irrigator's share of the effect of deviating might become negligible, while the benefits remain large, thereby increasing the incentive to deviate. There is therefore strong role for expectations and trust. To quote Baland and Platteau (1994, p. 129): "For cooperation to prevail on a large scale (. . .), it is not sufficient that a significant majority of people prefer universal cooperation but it must also be the case that these people feel confident that their willingness to cooperate is shared by many others too." There is thus an important tradeoff between the benefits of larger group sizes and the higher transactions costs and dilution of incentives that come with increased group size. The determination of workable group sizes in particular institutions will be determined by the factors affecting the level of that tradeoff.

The credibility of punishment is critical to the sustainability of cooperative mechanisms. When irrigators can gain extra (individual) benefits from deviating from the cooperative agreement, the cost of being punished must outweigh the short-run benefits from deviation for cooperation to prevail. For the threat of punishment to be credible, deviations must be detected and punished, which underscores the critical importance of observing actions and enforcing rules. Observability

is influenced by such factors as WUA group size, distance between irrigators, repeated interactions, and homogeneity of activities. Enforcement is affected by the relative size of gains from cooperation; the nature of the leadership, trust; the state of the legal system; and ethics, culture, and social norms. To make punishment credible, those who fail to punish violators must themselves be sanctioned. A impartial supra-authority, such as a council of elders or a state legal system, can facilitate the enforcement of these "meta-punishments" (term from Bardhan 1993a). However, the variability of water supply renders the benefits from cooperation—or, more specifically, from deviation from the cooperative agreement—variable. Periods of extreme water shortage can lead to incentives to deviate from the cooperative arrangement that override the disincentive posed by the threat of punishment.

Another kind of incentive to deviate from the cooperative outcome is related to the non-negative income constraints that farmers may face. Subsistence farmers living in quasi-autarky have low incomes during harvest periods (coupled with possible credit constraints) that limit the amount they can save from year to year. They thus can never choose a strategy that might expose them to a negative aggregate payoff over a year, no matter how unlikely that payoff might be.¹ This non-negativity constraint reduces the set of acceptable strategies and can restrict the number of possible cooperative outcomes, underlining the importance of complementary insurance and credit mechanisms.

"GROUNDING" THE THEORY: PRINCIPLES FOR VIABLE WUAS

Most previous reviews (with the exception of Cernea and Meinzen-Dick 1992 and Meinzen-Dick, Reidinger, and Manzardo 1995) have tended to focus on WUAs in traditional farmer-managed irrigation systems, rather than on those involved in large-scale, agency-managed systems. While many of the principles that strengthen traditional WUAs may also hold true for the latter cases, limits exist on how far indigenous organizations can be replicated through external intervention to stimulate WUA development in agency-managed systems (Hunt 1989). This study places greater emphasis on principles for WUAs in large-scale systems and those with some degree of agency management. The key features of WUA organizational structure reviewed here are:

- Origin
- Membership definition
- Size
- Federation
- Leadership roles and specialization

1. In game theory terms, negative outcomes are conferred a value of $-\infty$, thus driving the expected value of any strategy with a positive probability of that outcome to $-\infty$ also. Even more to the point, "trembling hand perfection" is a refinement of Nash equilibria that rules out any strategy that would even yield such an outcome with probability zero, just in case a player makes an irrational mistake (see Selten 1975).

WUA Origins

Two aspects of the origin of a WUA are particularly relevant to performance: (a) the age of the organization, and (b) whether the impetus for organizing was internal or external.

AGE. In general, **older WUAs are more likely to be stable, while newer organizations have to prove themselves.** In older organizations, patterns of action have had more time to become established and to become institutionalized as shared understandings. Members know what to expect in older WUAs, whereas members of newer WUAs are likely to be less certain whether their cooperation will be rewarded. Therefore, sustaining newer organizations often requires a more intensive effort.

The stability of older WUAs does not necessarily imply that they are active, nor that they are unchanging. WUAs that were established many years ago but are not active today (such as those in Pakistan described by Byrnes 1992, or the only two WUAs ever organized in Hong Kong as described by Chow 1991) are likely to remain as organizations in name only, unless something is done (internally or externally) to animate them. By contrast, even longstanding WUAs may change rapidly, especially in the face of external pressures. The need to formalize in order to get assistance from public agencies that require a particular type of registered organization (as cited by Shivakoti 1992 in Nepal) is one of the most prevalent examples of such change. Two other concepts important for the sustainability of organizations are their resistance to actions taken by small groups that could destabilize them ("viability") and the ability of small, newly formed organizations to induce the larger population to cooperate ("stability") (Axelrod and Hamilton 1981).

Ostrom (1994b) points out that institutions are "robust" if they can change according to rules that their members have defined in advance on how to formulate and change operations and governance procedures. Farmers' adaptability to new circumstances is a major factor in the success of user organizations in irrigation systems. Thus, **change and adaptation may be a good indicator of organizational sustainability for WUAs.**

ORIGINS. WUAs originating from internal initiatives are often found in small-scale, farmer-managed irrigation systems, while externally-induced organizations are more commonly found in large-scale systems with agency management. There are exceptions to this pattern. Outside agencies may start or strengthen local organizations that manage small-scale irrigation systems, for example, the irrigation management committees of community-managed systems in Zimbabwe or the communal irrigation systems in the Philippines. The former were originally organized by local missions or Agritex, the government agency responsible for smallholder irrigation development, but farmers manage the systems. In the Philippines, the National Irrigation Administration used institutional organizers to develop WUAs or to strengthen traditional organizations to take over the ownership and management of the small-scale systems. At the other extreme, WUAs can emerge spontaneously among irrigators within agency-managed systems. These are often not formally recognized organizations, but meet specific needs of the water users (see Wade 1988). For example, in the Meshwo system in Gujarat, the formal, government-organized WUAs were not functioning,

but informal associations had a strong role in providing farmers with a voice in decisionmaking for water allocation (Kolavalli and others 1994).

The question of whether the original impetus for a WUA came from within the group or from outside can have important implications for WUA activity, particularly in the organization's initial years. **It is generally easier for irrigators to have a sense of "ownership," that is, a personal stake, in a WUA if it started spontaneously among themselves than if outsiders brought the idea.** This does not preclude strong WUAs that were initiated by external groups, but in the latter context, organizers will have to ensure that members identify with the organizations's objectives and structure. Ultimately, the success of the organization will depend on whether the members find their benefits exceed their costs. They will often, however, perceive the benefits more readily if they sponsored the establishment of the organization.

One way in which externally-induced organizations can increase local people's identification with the organization is to **build on existing organizations wherever possible.** Seabright (1994) supports this by noting that cooperation becomes "habit-forming." Accountability and trust are important factors in sustaining cooperative outcomes, and existing local organizations have established practices and rules for cooperation. In practice, building on existing organizations requires looking for any types of associations—however informal—that may be operating in an irrigation system, and trying to work with them, rather than trying to replace them. It may also mean looking outside the irrigation sector for other types of active local organizations that would be suitable and would be able to take on a role in irrigation management (see box 3-1).

Box 3-1. Advantages of Building on Existing Institutions in Senegal

Village irrigation schemes in the Senegal River valley originated from proposals from the farmers, rather than an imposed model from the government. They thus organized around the strong indigenous institutions of village and age-set. According to Diemer, Fall, and Huibers (1991, p.14):

When members live in a single village, i.e. belong to the same political system, disputes are generally settled in the context of shared dependency and loyalty. . . . The success of village irrigation schemes is partly due to the match between the local political system and the infrastructure, as well as the fact that valley dwellers were free to organize the management of their schemes along the lines of a model with which they were all familiar.

This contrasts sharply with the greater mistrust and conflict prevalent under the dominant approach used for developing large schemes (1,000 to 2,000 hectare) in the Senegal River delta, which are managed by a "new, foreign, and more or less politicized and state institution: the cooperative." (Diemer, Fall, Huibers 199, p.18).

When such organizations are identified, their willingness to participate cannot be assumed, but must be ascertained through meetings with their leaders. At these meetings, the likely costs and benefits should be discussed, along with any training needs. If the support of existing leaders cannot be obtained, the likelihood that any new WUA will succeed is greatly reduced.

Where external, rather than internal, impetus is needed to organize WUAs, **the use of institutional organizers has been a major means for developing WUA organizations that members will have a strong stake in.** With this approach, the organizer needs to spend time with the irrigators so that they can identify with him or her. While the organizers may present the idea of forming a WUA, their role is to act as a catalyst for organizational formation, rather than imposing their own ideas. Ideally, the organizers should help the irrigators to identify appropriate local institutions to build on, as well as possible sources of conflict they should avoid. This takes more time than approaches in which external agencies require the formation of a particular type of organization, but it has proved valuable in creating stronger local organizations (see NIACONSULT 1994a; Uphoff 1992a).²

Whether the original impetus is internal or external, **WUAs that are adapted to local conditions will be more effective and sustainable than those that follow a single blueprint design.** Local adaptations not only make members feel the organizations are their own, but also allow the WUAs to develop their comparative advantage over centralized agencies: their information about the environment. Some standardization of organizational form is often a legal requirement for registering WUAs, particularly to operate bank accounts, obtain external assistance, or gain formal ownership rights to the systems. Even interaction with other WUAs may require a certain amount of consistency in rules and roles. However, the degree of standardization varies considerably, from simple registration requirements to adoption of a prescribed set of by-laws. The more varied the local environment of different WUAs—including the water resource, physical infrastructure, maintenance requirements, social structure, cropping patterns, and other economic conditions—the more important it is that WUAs be tailored to system or subsystem conditions. In more homogeneous local environments and WUAs that have greater interaction with other organizations (including other WUAs in a federated structure), greater standardization can be advantageous for the WUAs in their dealings with formal external organizations.

Membership Definition

Definitions of membership in WUAs are essential for determining who has rights and responsibilities within the group. This is why Ostrom (1992a) cites clearly defined boundaries of both the service area and the people who have access to water as the first design principle for long lasting, self-organized irrigation systems.

2. There is now substantial experience with using institutional organizers to develop WUAs. For a review of recruitment and other considerations, see Meinzen-Dick, Reidinger, and Manzardo (1995).

Groups are likely to be stronger if their membership is defined so as to maximize members' common interests. Because of irrigators' strong interests in their water resources, defining groups along the hydraulic boundaries of the irrigation system (that is, all farmers served by a common outlet, distributary, or other unit of the system) is the most common, as well as the most widely recommended practice (see Cernea and Meinzen-Dick 1992; Uphoff 1986). However, Goldensohn and others (1994) argue that this may not be a sufficient basis for common interests. If other ties are present that are stronger than those based on landholding within a common irrigation facility, such as village ties in Indonesia or tribal and lineage ties in Yemen (Vincent 1990), WUAs are often stronger if they are embedded in these existing organizations. By combining irrigation functions with other activities, the WUA builds on the value of the other linkages between users. This increases the information members have among themselves and raises the stakes of keeping on good terms within the group. For example, preserving one's reputation can be a powerful individual incentive that fosters successful organizations (Tirole 1993).

A more homogeneous background among the members helps in defining common goals for the organization, which thus becomes more efficient (Kanbur 1992). The most successful WUAs are often found where the layout of the irrigation system is consistent with traditional social organization (see Ait-Kadi 1988 for an example in Morocco). Thus using accurate social, as well as technical, information in the design of irrigation systems contributes to their performance. However, reviewing project experience in the Sahelian countries, Brown and Nooter (1992) found few examples of projects collecting such social information, and for those that did, the information had a limited effect because the project team either hired social scientists without integrating them into the design team, or collected such detailed information that it could not be processed in a timely fashion. Rapid rural appraisal techniques show more promise for gathering critical information in a timely fashion, and participatory rural appraisal can involve farmers in identifying their own preferences and constraints. For example, the preparation of a system profile with social and technical information was an integral part of the Indonesian program of small irrigation system turnover. The emphasis was on helping farmers to identify problems, alternatives, and solutions and to reduce the effort spent in generating data and filling out forms. It not only provided valuable information about existing management, leadership, and organization WUAs and their history, but also enhanced the ability of agency field staff to work with farmers in a participatory manner (Bruns and Dwi Atmanto 1992).

The definition of membership has important implications for equity. The exclusion of some irrigators from membership tends to weaken the organization by introducing inequality in the rights, responsibilities, and representation of the resources users and by reducing the pool of potential resources on which the organization can draw. This can create tension between members and other irrigators who are outside the group. Even with inclusive membership, WUAs are susceptible to takeover by local elites (Oorthuizen 1994). Organizational structures that provide for the representation of tail-enders or small farmers increase equity, provided they are locally recognized

rather than externally imposed.³ Ostrom and Gardner (1993) demonstrate that bargaining among WUAs members who recognize their mutual dependencies, expect to work together for a long time, and are assured that their decisions will not be undercut by external authorities can result in a wide variety of rules that improve equity as well as efficiency.

From an equity standpoint, including some stakeholders other than irrigated landholders in the membership may also be desirable. The goal of having a more equitable water supply serves as a potent unifying force among members of the Chilean users associations, whose membership comprises water users from agricultural, industrial, and urban sectors.

Including other stakeholders might mean making explicit provisions for tenant farmers, women (whose work load is often affected by irrigation, and who have a strong stake in water for domestic use or livestock), or other marginal groups. For example, current efforts to organize farmers' organizations at the distributary level in Tamil Nadu, India, include plans to use women organizers and to reserve positions for women farmers on the councils, while deep tubewell groups developed under the guidance of the Bangladesh Rural Advancement Committee are composed half of male and half of female shareholders drawn from existing village groups (Jenkins 1993). Although women may not always, in practice, participate as directly in meetings as men, specifying that both husband and wife of cultivating households are members allows more flexibility for women to participate and is preferable to allowing only one member per household (Zwarteveen 1994b). Suphanchaimat (1993) reports that when informal water user groups for pump irrigation in Thailand were formalized into legally recognized water user cooperatives, only one member per household was allowed. This was usually the male "head of household," and the number of female members declined. By contrast, in the Mountain Province of the Philippines, because of women's roles in agricultural and household decisionmaking, especially with regard to cash flow: "Community organizers also learned that unless women were encouraged to participate, financial obligations of farming households could not be guaranteed" (Illo n.d., quoted in Zwartveen 1994b, p.34).

With the exception of WUAs in the Philippines, which have made considerable progress in including tenant farmers, and organizations in Mexico, which make explicit provisions to include *ejidatrios* with small landholdings, few examples of successful attempts to include such stakeholders, particularly the disadvantaged are available (see box 3-2).⁴ In a glaring example of exclusion, the WUA ordinance in Sindh, Pakistan, explicitly excludes tenants from joining WUAs or forming their own WUAs to obtain credit. Unless local people are willing to include tenants and nonirrigators, their involvement will require outside pressure, either from external agencies or from

3. For example, Ostrom and Gardner (1993) report on several mechanisms from farmer-managed systems in Nepal that improve equity by including representatives from the head and tail. Plusquellec (1989) reports that the boards of directors for WUAs in Colombia are composed of four members representing farmers with 20 hectare or less and three members with more than 20 hectare to balance the interests of small and large farmers.

4. *Ejidatrios* are farmers with usufruct rights to cultivate government-owned *ejido* land.

the disadvantaged groups themselves. Zwarteveen (1994b) points out that gender concerns will not be adequately addressed if left to markets and community organizations. For example, tank rehabilitation projects carried out by the National Development Foundation in Sri Lanka gave opportunities to women and children, but this was attributable to the efforts of the nongovernment organization (NGO) that implemented the project (Dayaratne 1991).

One category of stakeholder that it is often advantageous to exclude is professional local and regional politicians. Examples from Nepal (Shivakoti 1992), Sri Lanka (Uphoff 1992a), and elsewhere have underscored this point: the introduction of party politics can increase factionalism within the organization. Partisan politics can interfere with irrigation management activities. The irrigation fee is especially prone to such politicization. In Italy, the body responsible for irrigation is dependent on local governments. As a result, irrigation tariffs are not fixed according to the financial requirements of the necessary work, but according to political considerations.⁵ However, local politicians may also be able to mobilize external resources on behalf of the irrigators, or represent them effectively with outsiders (see Kolavalli and others 1994). The effect of including politicians will depend on the extent of factionalism that they bring into the WUA relative to the external resources they are able to tap.

Box 3-2. Women's Involvement in WUAs in Senegal

In Senegal, women on small-scale schemes in the middle valley have no rights to cultivate irrigated plots independently from their husbands. The local rural council, which favored allocation only to the men, rejected a proposal to allocate land equally between the fifty seven men and sixty one women participants on the Niandane III perimeter was not accepted by

In the upper valley, women in Sininke communities who were restricted from access to irrigated plots formed their own women's groups to develop gardens. These areas of high-value vegetable crops close to the river are mostly irrigated by buckets. However, some women's groups acquired pumpsets, and even expanded the area cultivated (Woodhouse and Ndiaye 1991).

Size

The question of optimal size for WUAs is complex. Examples in the literature range from 2 hectares to 80,000 hectares, and from ten farmers to several thousand.⁶ A major difficulty in

5. By contrast, Gazmuri (personal communication 1994) reports that in Chile, when members of WUAs developed a sense of ownership and could no longer make a political issue out of fees paid to the state, they tended to be willing to pay more for irrigation.

6. Community-managed irrigation systems in Zimbabwe are as small as a few hectare. (Makadho 1990), while the Chianan Irrigation Association in Taiwan covers 80,000 hectare. (Lin

comparing the size of WUAs lies in the need to distinguish between *area covered* and *number of members*. For example, a pump scheme in Madiun, Indonesia, has a WUA covering 100 hectares with 400 members, while in Coello, Colombia, a WUA covering 4,531 hectares has only 280 members because of the larger average holding sizes in Coello. Both area and number of members are important: area affects the geographical distances to be covered and monitored, while the number of members affects the complexity of getting input and agreement from members. However, many studies report area or members, but not both.

The other complicating factor in comparing WUA size is the issue of WUA level. Base units serving the system below a tertiary outlet may be quite small, but these can be federated upward to cover thousands of hectares. Using the size of base units is one way to ensure comparability, but if little activity takes place within the base unit, the size of higher-level units may be more relevant. The size of the highest-level organizations also shows the potential scope of responsibilities for WUAs.

Conventional wisdom, based either on game theory or on the experience of traditional WUAs in Asia, indicates that organizing WUAs is more difficult if the units are too large. Smaller groups gain in five respects when cooperating: cooperative strategies are more likely observable, the share in the loss from not following the rules is larger, interlinkages among group members are likely to be more important, negotiation costs are lower, and stronger community ties provide "much needed rules of thumb" (Bardhan 1993a). Cernea and Meinzen-Dick (1992) and Uphoff (1986), for example, both found 40 hectares to be the median size of base-level organizations. By contrast, experience in Argentina and Mexico suggests that larger WUAs—5,000 to 10,000 hectares—perform better (Chambouleyron 1989; Simas 1993). Some of this difference may be a result of the performance criteria used: the studies in Asia have tended to focus more on the extent of cooperation for irrigation activities among WUA members, while the examples from Argentina and Mexico emphasized organizations' financial viability.⁷

Club theory, found in the economic literature (for example, Buchanan 1965; McGuire 1972; Olson 1965), provides some insight into this issue. WUAs have many of the characteristics of a club, defined by Sandler and Tschirhart (1980, P. 1482) as "a voluntary group deriving mutual benefit from sharing one or more of the following: production cost, members' characteristics, or a good characterized by excludable benefits." This literature suggests that there is an optimal membership size for a club or an organization at the point where average cost reaches its minimum by spreading the fixed costs of production over a number of members, but before further increases in size raise costs because of congestion and crowding. For example, in Mendoza, Argentina,

1991).

7. In a study of local organizations for rural development (including, but not restricted to, irrigation), Esman and Uphoff (1984) found that larger organizations tended to perform well. However, they suggest that large size does not necessarily lead to good performance, but rather that organizations that perform well are more likely to grow.

Chambouleyron (1994) found that per hectare costs dropped dramatically as WUA size increased to 2,000 hectares, then started to increase again as size increased beyond 10,000 hectares.

While this theory is suggestive, no single optimum size for WUAs exists. Differences in the structure of transactions, monitoring, and administrative costs between countries and systems have a profound effect on optimal size. With larger farm sizes as in the more commercialized systems in Argentina or Mexico, fewer members need to interact in an organization covering thousands of hectares than in situations of small irrigated holdings, which reduces both transaction and monitoring costs. Land consolidation has been used to reduce management costs for WUAs in Taiwan and Japan, whereas Chan (1991) cites fragmentation as a problem in Malaysia. The development of infrastructure, particularly for transportation and communications, also reduces transaction and monitoring costs. Chilean and Mexican commercial farmers with telephones or radios and pickup trucks can cover larger distances at lower cost than Nepali farmers who have to walk over steep slopes. **Administrative structure, costs, and WUA size are similarly inter-related:** the more that is done by face-to-face meetings of farmers (either for decisionmaking, operations, or maintenance work), the more costs increase with membership size. The use of decisionmaking boards and professional staff for O&M reduces the need for all members to meet and interact, thereby changing the administrative costs, and allowing greater economies of scale.

Federation

One way in which even small base units of WUAs can take on a broader range of activities and take advantage of economies of scale is through federation. This allows coordination between WUAs at each level and permits them to undertake activities at the next higher level of the system.

Box 3-3. Federation Structures in the Philippines and the Dominican Republic

The Upper Pampanga River Integrated Irrigation Systems in the Philippines has rotation unit groups of four to seven farmers to improve interaction among neighboring farmers to improve water distribution, farmer irrigator groups of three to six rotation unit groups, farmer irrigation associations of all farmer irrigator groups with a single water source, and a Federation of Farmer Irrigators Associations to coordinate between farmer irrigator associations and with agency staff.

In the Dominican Republic nucleos are responsible for water distribution and maintenance at the watercourse level. At the distributary level, water users' associations are responsible for guaranteeing efficient irrigation service to nucleos, including routine maintenance of distributaries, work plans for members to clean facilities, and budgets. At the system level the Junta de Regantes enforces regulations; allocates and distributes water to laterals; maintain irrigation and drainage infrastructure; resolves disputes; and provides business management services, such as budgeting, fee collection, and records (NESPAK 1994).

Base-level WUAs from each outlet on a distributary may each send representatives to a distributary-level WUA that can allocate water between the outlets, negotiate conflict resolution between base-level WUAs, or even undertake responsibility for O&M along the distributary. These units may, in turn, be federated into a higher level, culminating with an apex-level organization for the system as a whole.

All levels of a federated structure are unlikely to be equally active. In some cases, WUAs are primarily involved in maintenance or water management at the tertiary level, and apex organizations have little regular activity. In other situations, for example, under the *warabandi* systems of northern India and Pakistan, there is little need for regular collective activity below the outlet, but allocation between outlets could be a major focus for WUA activity.⁸ As higher-level organizations become established and gain legitimacy, their functions often expand. Possible roles for second or higher tiers of organization include settling disputes between lower-level units, coordinating training, and facilitating access to other services. Apex-level irrigation associations in Taiwan even undertake planning and statistical studies for irrigation development (Lin 1991).

In addition to allowing WUAs a wider scope of activities, WUA federations facilitate two-way interaction between irrigators and irrigation agencies. If the WUA federation structure follows hydraulic units, it is likely to parallel the agency's staffing structure, thereby forging a clear link between the farmers' representatives and particular agency staff as is the case, for example, in the Federation of Farmer Irrigators Associations in the Upper Pampanga River Integrated Irrigation Systems in the Philippines (Ferrer and Lucero 1988). This is useful for agencies, which can tap into the federations as a way of structuring training or conveying information to farmers.

From the farmers' side, whereas individual, base-level WUAs may have little influence in negotiating with agencies or other outside interest groups, a federation that represents a larger body of irrigators carries more weight. For example, individual WUAs in Egypt have difficulty in obtaining pump maintenance services from private companies, but federations are likely to be able to negotiate better service contracts. Thus, **federating provides an organized forum for expressing farmers' interests and adds to the effectiveness of WUAs in providing decisionmaking input from their membership.**

Greater user input into decisionmaking about water allocation is an important benefit of federations (box 3-4). In Tamil Nadu, India, farmers expressed keen interest in forming federations to lobby more effectively to protect their water allocation from growing numbers of municipal and industrial uses. User associations that include all who hold rights to water from a common source (including agricultural and other uses) are able to negotiate intersectoral allocation among themselves in Chile. During periods of acute water scarcity, agricultural users have lower priority than urban users. However, even during the three most severe droughts, agreements were reached

8. Kolavalli (1994) notes that collective sanctioning is, however, necessary for *warabandi* rotations to operate efficiently.

in the vast majority of cases because all parties negotiate directly and prefer to "keep the state out" (Rosegrant and Gazmuri 1994).

Box 3-4. Intersectoral Water Allocation at the Local Level in Indonesia

In Indonesia, a group of fifty farmers with the village leader as head organized themselves into *subaks*, initially with the purpose of diverting water for household use (Pitana 1993). The *subaks* assumed full responsibility for the design, construction, and financing of the project, with the state brought in only to assist in the engineering design. Surplus water was diverted for irrigation purposes, and rights to this water were distributed among individual members and village communal lands.

Leadership Roles and Specialization

While virtually all WUAs have some leadership roles, the degree of specialization varies considerably, from systems in which all members directly participate in O&M, to those that hire professional staff to undertake all day-to-day activities. The degree of specialization is positively associated with market penetration and the system's technical and administrative complexity (as discussed later). A trend toward professionalization can be seen even within WUAs that initially operated through direct participation by the general membership. Members of the Sukhamajri system in India, who originally operated the pump and distributed the water among themselves, recently hired a young man to operate and maintain the pump on their behalf (Seckler, personal communication 1993). Work may be contracted with private companies, other WUAs, or even with the irrigation agency. For example, Plusquellec (1994) reports on a WUA in Morocco that provides repair services for canals using advanced equipment its members have purchased, while the farmers' association in the Friar Lands irrigation system in Cavite, Philippines, has contracted back with NIA to undertake adequate O&M at the farmers' expense (Goldensohn and others 1994).

In analyzing role specialization within WUAs, distinguishing between organizational roles and technical roles is useful (Cernea and Meinzen-Dick 1992). Organizational roles, such as the common offices of president, secretary, and treasurer, deal with the running of the WUA itself, whereas technical roles, such as ditch tender or pump operator, deal with the running of the irrigation system. The former are usually selected from among the membership, and may be paid or unpaid roles. Such leadership may even be embedded in other social leadership roles, such as tribal chief (Hunt and Hunt 1976). Those who hold technical roles are usually employees of the association, and are often not irrigators or members of the association. Indeed, cultivators in the command area may be excluded from many technical roles because they are less likely to devote full time to the work, and may give preference to particular areas. In Chile, farmers at the lowest level of the federation (*comunidad de aguas*) are in charge of maintaining their own secondary, tertiary, and quaternary

canals. The WUAs hire technicians and engineers to carry out other repairs and minor rehabilitation, but contract out major construction contracted out to outside engineering companies via bidding.

As WUAs take on an expanded role in managing larger and more sophisticated irrigation systems, new roles are often incorporated. Examples are organizational roles, such as supervisory boards, vigilance committees, professional managers (as in Argentina), accountants and auditors (as in the Dominican Republic), lawyers (as in Colombia), and even a sociologist (in the Dominican Republic); and technical roles, such as machinery or computer operators, soil scientists (as in Mexico), and even engineers hired by the associations (as in Taiwan and Mexico).

As WUAs take on supervisory committees and hire professionals to manage their systems, the distinction between the structure and capacity of WUAs and of agencies becomes blurred. Organizational structures may even be interlocking, with WUA representatives sitting on project management committees (as in Sri Lanka), or agency representatives sitting on WUA boards (as in Greece or Morocco). The major difference between WUAs and agencies usually lies in the selection and accountability of their leadership and technical staff, with WUA leaders and staff accountable to the members and agency staff accountable to the upper levels of their agency and to the government.

Even this distinction is blurred in many cases, particularly where agencies or local governments can appoint WUA leaders (box 3-5). For example, in Madhya Pradesh, India, where irrigation *panchayats* are compulsory, the land owners elect a *panchayat* head and council members from among themselves, but these elections are subject to approval by the Collector (a civil servant of the Revenue Department), who can dismiss or nominate anyone he or she likes, and can dissolve a *panchayat*, subject to an appeal (Raju 1992). In such cases it is questionable whether the officers—and even the associations themselves—really represent the members, and hence whether they can be effective as WUA leaders.

Box 3-5. Selection and Accountability of Leaders in the Republic of Korea

South Korea has three types of associations: farm land improvement associations, *hungnong gae* (farmers' clubs that promote improved varieties of irrigated paddy), and water user associations. Theoretically, the members freely elect all leaders, but in the case of the farm land improvement associations, (legal public enterprises responsible for large and medium-scale irrigation schemes along with nonirrigation functions), the minister of agriculture and fisheries appoints the leader. The leader of the *hungnong gae* is recommended to the members by the village chief, and should be elected by a unanimous vote. Only the WUA leader is elected freely by the members (Park 1985).

Mechanisms to ensure the accountability of leaders and employees to the WUA's members become increasingly important as roles become more specialized. Where members and staff

interact directly on a regular basis, further accountability mechanisms may not be required. In other contexts, supervisory boards or vigilance committees monitor the performance of the staff on behalf of the members.

Formal monitoring is most commonly found in financial management. Unfortunately, conventional accounting procedures (frequently imposed by legal regulations or external organizations) may be too difficult for leaders or the general membership to understand. Belloncle (1984) found that in several Sahelian countries, neither WUA members or leaders nor local government officials could understand the management accounting system, because it was not in the local language and used complex vocabulary. The alternatives are to train both the leaders and members to understand the accounts or to develop simpler accounting procedures. Internal accounting audits increase users' identification with the WUA, as they make decisionmakers responsible to the association directly rather than to the agency. Instead of externally audited accounts, members of the traditional Raj Kulo irrigation system in Nepal appoint an audit committee composed of irrigators representing various interest groups to examine all financial records and verify their accuracy. This has proven effective in eliminating fraud and ensuring members' confidence in the handling of funds (Yoder 1994).

The skills of individuals occupying leadership positions are as important to WUA success as the definitions of the roles themselves. Baland and Platteau (1994) demonstrate that in a case in which a critical mass of members is needed for cooperative action to pay off, a catalyst might be required. These catalysts are leaders who use their organizing skills to resolve the coordination problem that exists. However, such skills are difficult to assess, and even more difficult to compare across systems. What little is reported in the case studies tends to treat the skills of organizational leaders, in particular, as idiosyncratic. For example, the success of a project in the Anuradhapura district of Sri Lanka was attributed to the strong role the Buddhist temple leader had on the project and his influence on the families in the area (Dayaratne 1991). Similar influential leadership has contributed to the success of some WUAs for tanks in Thailand (Tubpun 1986) and of the Mohini irrigation cooperative in Gujarat, India.

While charismatic individuals cannot be replicated, a number of studies emphasize the significance of training programs for WUA organizational leaders.⁹ The training may be as basic as how to run a meeting, or it may cover more complex aspects of accounting or of legal regulations affecting WUAs.¹⁰ Training often emphasizes the operation and maintenance of irrigation facilities

9. Musa (1994) points out that too often, training is directed at farmers only, with not enough attention to training needed by government officials to work with farmers.

10. Indigenous "age-sets" along the Senegal River show how training at a young age can lead to sound leadership and organized groups. Parents organize an age-set for boys and one for girls aged eight through twelve. In these age-sets, the children elect a president, and treasurer and decide on paying dues to purchase drinks, candies, and other items. In this way the children learn how to act as members of a group and build capacity for future organizations (Diemer, Fall, and Huibers

and the calculation and collection of service fees. More specialized training, ranging from water management procedures to the operation of specific machinery (including computer programs, as in Mexico) is often required for technical staff.

Some projects also provide training for general WUA membership to improve members' understanding of how the organization and the irrigation system operate. Physical construction activities provide an opportunity for training association members in management tasks (Water and Energy Commission Secretariat and International Irrigation Management Institute 1990).

One important principle for training is that it should be as close to the trainees' direct experiences as possible. This requires developing training materials in the local language, as well as using more applied techniques. For example, the Madura groundwater project in Indonesia used system walk-throughs, videos, posters, and O&M manuals for training. While the farmers enjoyed the videos and thought they were useful, they rarely read the manuals (Jackson 1991). In the Philippines, NIA used lectures, group sharing, small group tasks, case analysis, and other applied techniques (Wijayarathna and Vermillion 1994). In Nepal, farmer-to-farmer training has shown great success, because it relates most directly to people's experiences. This includes both organizing tours for members of newly organized WUAs to systems with strong local management organizations, and hiring leaders from successful systems as consultants to other WUAs (Ostrom and Gardner 1993; Water and Energy Commission Secretariat and International Irrigation Management Institute 1990). Having local farmers fulfill these extension duties further helps demonstrate the replicability of WUAs, and thus fosters cooperation. Many face-to-face applied training techniques limit group size, but videos and the use of mass media campaigns (as in Mexico) can extend applied training to large numbers of farmers.

4. EXTERNAL CONDITIONS FOR SUSTAINABLE WUAS

Although many WUAs have proven effective in managing irrigation systems, such organizations should not be used as a blanket prescription for irrigation management in every context. WUA development requires considerable investment in developing social capital, certainly on the part of the members, but often also by external organizations or development projects as well. In many cases the WUAs fail; in others, they may not be the most efficient way to improve irrigation system performance. Vermillion (1994) suggests that often, inadequate policies and conditions to support WUAs lead to "false failures." Thus the likelihood of success depends not only on the WUAs' internal structure, but also on the impact of external forces and on the match between organizational structures and the conditions in which WUAs operate.

The concept of *sustainability* of WUAs in this paper relates to long-lasting organizations. This does not mean that the organizations are unchanging. Indeed, change is often necessary for long-term viability. Nor does the concept imply that WUAs are necessarily *self-sustaining*, that is, that they can continue to exist without external inputs. Too often a short-run project mentality is applied in assessing WUA viability: initial assistance is given to organize or strengthen WUAs, which are then expected to stand on their own without further assistance or external intervention. This too often leads to assessments that the organizations have failed if they cannot cope independently with major problems or calamities. Moreover, confusing sustainability with self-sustainability ignores the fundamental requirement that most WUAs must interact with government agencies and other external groups on a regular basis. The more appropriate issue is not how to get organizations to function without any external assistance, but to identify what types of interactions and assistance are required for long-term viability, and how to create a facilitating framework for sustainable WUAs.

In this section, we address the question of **the conditions under which WUAs are likely to succeed**, based on an examination of the effects of a number of factors external to the organizations (figure 1-3). These factors can be classified as follows:

Physical and technical factors:

- Water scarcity
- Technology and infrastructure

Social and economic factors:

- Local social organization
- Market penetration
- Farmer incentives
- Financial viability

Policy and governance factors:

- Policy environment
- Legal framework
- Agency structure and incentives

PHYSICAL AND TECHNICAL FACTORS

The physical environment has a strong effect on human organization and activity, particularly in irrigation systems, which revolve around the manipulation of water and technology to deliver irrigation to farmers' fields. The nature of irrigation resources places particular demands on local management, as discussed in chapter 2. This section deals with the effect of water scarcity and technological infrastructure on the nature, as well as on the likelihood, of WUA activity.

Water Scarcity

Many authors have suggested the existence of an inverted-U relationship between water scarcity and returns to organization (for example, Bardhan 1993a; Uphoff 1992b). When water supply is plentiful, farmers have little reason to organize, as they already have the necessary water. As water becomes scarcer, farmers need to coordinate their actions to acquire and distribute it. Benefits from organization thus increase.¹ As water becomes still scarcer, even perfectly coordinated actions and investments cannot solve the water shortage, and thus the benefits from organizing are lower.² Areas with moderate water scarcity therefore have higher returns to organization. Consequently, certain communities are more likely to cooperate, which could help explain the uneven success rates.

This inverse-U relationship between water scarcity and returns to organization implies that organizational efforts will show the most rapid results if they are concentrated in areas of moderate scarcity. However, this provides little firm guidance for particular situations. Even if data were available to plot water availability per unit area against organizational activity for a large number of cases, the results would be unlikely to show a smooth curve and a critical inflection point, because absolute water availability is only one (albeit important) aspect of scarcity. Farmers' comprehension of the benefits of organizing and of the impact of individual water appropriation on the total supply, though difficult to measure, plays an important role in determining the level of organization (Baland and Platteau 1994).

Even for an external assessment of water scarcity we need information about the relative water supply, that is, the supply relative to the demand. Demand, in turn, is affected by the availability of alternative water supplies, cropping patterns, and returns to agriculture. Alternative water sources such as rainfall or private wells reduce water scarcity and the need to cooperate to obtain water.

1. Bruns and Dwi Atmanto (1992, p. 16) report that among small irrigation systems in Indonesia; "Farmers in water scarce areas tend to be more interested in improving irrigation management. In water abundant systems, farmers tend to continue current, less formal, management patterns."

2. For example, in the Kirindi Oya Project in Sri Lanka, the WUA was newly established when the 1986/87 drought occurred. Neither the agency nor the WUA were able to prevent crop failure in most of the newly settled area, and farmers had to leave the area. The farmers' association president was accused of taking sides with officials, and the resulting disputes undermined an already weak organization (Merrey and Somaratne 1989).

Crops that consume considerable water and are sensitive to moisture stress (for example, paddy, sugarcane) increase water demand. The more lucrative irrigated agriculture is, the greater the demand for water. This, in turn, is influenced by the availability of alternative income (or food) sources, government price policies, and the degree of market penetration.

The degree of water scarcity varies over time: between years, between seasons, and even within a season. In general, we can expect organizations to be more active during a moderate drought. (During severe droughts, in which farmers must abandon cultivation and look for other livelihoods, WUAs may show little activity). For example, informal tank irrigation management associations in Tamil Nadu, India, became more active and spent more on channel cleaning in years of water deficit (Palanisami, Meinzen-Dick and Svendsen 1994), and the *syndics* in Valencia, Spain, institute a rotation between diversions and increase patrolling activities during extraordinary droughts (Maass and Anderson 1978).

Main system management plays a major role in determining water scarcity (Chambers 1988). Even if water availability per unit area is sufficient in total, poor management leads to excess in some areas and times and deficiencies in others. Poor main system management will reduce incentives for WUA activity, because some groups have a surplus and no need for organization, while others see the situation as hopeless, unless organized action by farmers leads to a clear improvement in main system distribution.

Technology and Infrastructure

Notions that technologically complex irrigation systems require state management have been challenged, first by studies that revealed the complexity of traditional farmer-managed systems (for a review of examples see Yoder 1994); then by a growing number of pump systems under farmer management; and more recently by examples of farmer management of modern systems with advanced technology, as in Mexico. **Thus, advanced technology is not necessarily a barrier to WUA management of systems. It does, however, have implications for the organizations, creating the need for specialized training and adequate support services (especially for maintenance).** Goldensohn and others (1994) report that WUAs in Indonesia and the Philippines lacked the necessary skills to maintain concrete headworks that were built in place of the wooden or earthen structures that farmers were accustomed to. Individual WUAs may have difficulty in obtaining repair services, especially in remote areas (as in Egypt or Zimbabwe). Advanced technology also favors the use of specialists to manage the equipment, instead of direct activity by all members.

Another important effect of technology is on the costs of O&M. Energy costs for pumping systems are high in many developing countries unless cheap hydropower or diesel are available. Irregular energy supplies or repair services often reduce the reliability of pumped irrigation supplies, thereby reducing the benefits to farmers. Thus, while it may be technically feasible for WUAs to manage sophisticated irrigation infrastructure, the economic and financial feasibility of WUA management of such systems must be investigated and assured.

Specific technologies can shape the need and possibilities for collective action to produce irrigation services. For example, Lam, Lee, and Ostrom (1993) suggest that in systems without permanent headworks, head-enders need the assistance of tail-enders to rebuild the diversion structures if any users are to receive water. This builds stronger ties among the users and gives tail-enders more bargaining power than in systems with permanent headworks (especially if the latter were built with external assistance and little local investment). "Lining may have the opposite effect. It makes it easier for water to get at the tailend without as much work on the part of all farmers. Everyone may be motivated to free ride on maintenance for awhile. There may be some tradeoff between rigorous rules and investments in physical capital" (Ostrom, personal communication 1994). However, control structures that allow WUAs to cut off water supplies to those who break the rules can strengthen them.

In addition to the irrigation infrastructure, infrastructure for transportation and communications facilitates WUA activity by making it easier for members to meet, to travel along the system, and to monitor compliance. Technicians employed by Chilean WUAs, for example, have trucks and direct radio links with farmers, which allows them to attend to water flow problems promptly (The implications of the resulting reduction in transaction costs for the size of associations were discussed in chapter 3).

SOCIAL AND ECONOMIC FACTORS

While the physical environment of irrigation systems is more readily observed, their social and economic environment has just as much influence on the activity of WUAs. Both anthropological case studies and game theory have noted the effect of social norms and cultural patterns on cooperative behavior. Economic forces have powerful influences on the incentives for participating in WUAs, and shape the way in which organizations operate. This section covers how social organization, markets, individual farmers' incentives, and financial viability shape WUAs.

Local Social Organization

Social cohesion among farmers facilitates collective action in WUAs. Strong local institutions can provide the basis for WUAs, while the erosion of social ties through market penetration can undermine WUA activity. Rapid appraisal and participatory appraisal techniques, such as those used in Indonesia's small irrigation system turnover program, (Bruns and Dwi Atmanto 1992) can help in assessing the degree of social cohesion and irrigators' attitudes toward cooperation for irrigation, but they do not provide simple predictors on collective action.

The degree of homogeneity among irrigators is a more straightforward indicator to assess, and this is positively related to WUA cohesion. Homogeneity of background includes whether irrigators are from the same village, ethnic group, lineage (for example, in Pakistan and Yemen), or caste, while homogeneity of assets relates primarily to landholding size. Homogeneity of background increases the number of social ties and norms that irrigators can draw upon in building cooperation. Social or economic heterogeneity increases the potential for factionalism within the group, which can be manifested in disputes or in one group's dominance of the organization, as reported by

Diemer, Fall, and Huibers (1991) in a case from Senegal.³ Lynch (1988) reports that immigrants in the La Huaylla irrigation system in Peru caused considerable disruption to local system management not only because of their different background, but also because they lacked experience with irrigation or a tradition of working in groups.

Social and economic divisions can be thought of in terms of fracture lines. If these fracture lines coincide with head-tail location in the irrigation system (or other potential sources of conflict relating to WUA activity), they have a greater impact than if those from all backgrounds are distributed more evenly through the system. Yoder (1994) cites the importance of upstreamers having some plots downstream so as to create a common goal with downstreamers. In Nepal, Ostrom and Gardner (1993) found the most equitable water distribution where large farmers had land in the tail, that is, where asymmetries in landholdings and location in the irrigation system offset each other and emphasized the mutual dependencies among irrigators. Note, however, that heterogeneity of assets can also yield complementarities between users, particularly where leadership and entrepreneurship are needed (Baland and Platteau 1994; Ostrom 1992b). For example, richer members of the community may be able to assume a higher share of the costs of organization or of exceptional expenses, may have better external contacts, and may be willing to contribute material resources in exchange for prestige or other social goals. **The proper identification of these complementarities, along with an organizational framework that induces all to cooperate, is necessary if heterogeneity is to foster, rather than impede, cooperation.**

Market Penetration

Overall commercialization of the agrarian economy has contradictory effects on WUA development. On the one hand, market penetration is often linked to a loosening of traditional social ties as individuals increasingly depend on impersonal markets rather than on interpersonal relationships for inputs, sales, and even security. Traditional patterns of interpersonal cooperation provide a good basis for cooperation within WUAs. As Vincent (1990, p. 24) points out:

Heavy interdependence through sharecropping of land and water, and communal mobilization of water and maintenance create economic reasons for cooperation, while strong traditions of "Brotherhood" in the face of external rule provide some framework for decentralized management.

Markets often provide alternatives to collective action, for example, for pooling risk. With market penetration farmers become more anonymous, lessening mutual dependencies and diminishing interlinkages for possible reprisals in the case of adverse behavior (Ostrom and Gardner 1993), which reduces the prospects for cooperation (Bardhan 1993b).

3. Both conflicts and the appointment of leaders from one faction were reported as common problems in groundwater WUAs in western Madura, Indonesia, while WUAs in eastern Madura were more cohesive (Jackson 1991).

On the other hand, market penetration can increase the economic returns to irrigated agriculture, and thereby farmers' incentives to participate in WUAs. Jackson (1991) reports that farmers in western Madura, Indonesia, became much more interested in WUA activities when markets for dry season fruits and vegetables developed in a nearby city, thereby increasing farmers' returns to irrigation. Tubpun (1986) similarly found more successful WUAs where markets were more developed.

The net result of market penetration is seen not so much in the degree of WUA development, but in their structure. Those in areas of low market activity (particularly of labor markets) are likely to rely on direct participation and labor or in-kind contributions from members, while those in highly commercialized areas are more likely to employ specialists for daily operations, with members making cash contributions. Similarly, in areas of low market development the existing organizations on which to build are likely to be multipurpose, social institutions, while in commercialized areas more specialized farmers' organizations may be available.⁴

Farmer Incentives

The initial success and long-run sustainability of WUAs depends on sufficient incentives for farmers to participate more than on any other single factor. What exactly are the incentives for farmers to participate in managing irrigation systems? Just as central agency staff need incentives to increase farmers' involvement, farmers should be able to discern that they will gain from assuming responsibilities that were previously carried out by the state. Because farmers bear substantial monetary and nonmonetary costs in connection with expanded WUA activity, unless they also perceive the resulting benefits to be substantial, they will choose not to become involved (box 4-1).⁵

Farmers may be induced to participate based on gains that may be either transitory or enduring. This distinction has important implications for bolstering farmers' involvement in management and for the success of turnover systems. Although immediate benefits from participation could secure initial interest from farmers, such transitory stimuli may be insufficient for sustaining user participation in irrigation management, a factor that may explain the disappearance of some WUAs. For example, watercourse lining provided a sufficient incentive for 17,000 WUAs to be registered in Pakistan, but few of these continued to be active after the lining was completed, because there was neither a significant role nor significant benefits from WUA activities.

4. In the San Juan area of the Dominican Republic, a successful farmers' cooperative was reorganized to take on irrigation responsibilities (NESPAK 1994). However, in many cases cooperatives are not strong institutions on which to build WUAs.

5. For an estimate of the value of farmers' formal irrigation costs and WUA contributions under tank irrigation in south India see Meinzen-Dick (1984).

Box 4-1. Farmers' Preferences for Agency Management in Zimbabwe

In a recent study of irrigation system performance in Zimbabwe (Rukuni, Svendsen and Meinzen-Dick forthcoming), more than 70 percent of farmers on sample systems managed by either Agritex (the government agency responsible for smallholder irrigation development) or community groups reported that they would prefer to have Agritex manage the systems, even if it meant paying twice the existing irrigation service charges. Indeed, during the study year one community-managed system petitioned Agritex to take it over, because problems with the system's infrastructure and divisions within the irrigation association became too great for the system to continue functioning.

Several factors contributed to farmers' reluctance to assume full management control, even of the small systems. First, farmers' cash costs of managing the systems were likely to exceed even twice the prevailing irrigation service fees, especially on systems with pumped water supplies. Second, Agritex does a relatively good job of managing systems and of providing extension services and advice to smallholders on the schemes. Third, WUAs were likely to have difficulty in obtaining repair services in the remote areas in which many smallholder schemes are located. Finally, many farmers reported that they did not feel their WUAs were capable of carrying out many of the management functions or did not wish to deal with conflicts among themselves. The latter consideration provides an indicator of farmers' perceptions of transaction costs for assuming WUA management of the systems.

However, considerable time lags in realizing some benefits from participation may affect farmers' willingness to participate and the sustainability of participatory approaches to irrigation projects, particularly if no progress is made on immediate problems. "Unless something in the existing system causes dissatisfaction to the individual farmers, which could be corrected by forming an association, no WUA will be established" (Patil 1987). Farmers' considerable investment of effort, time, materials, and money to assume management control of the systems should yield a profit in terms of tangible and nontangible, immediate and enduring rewards that exceed the value of their investment. Farmers value these rewards differently according to their culture, location, and other demographic characteristics. The following paragraphs describe some incentives that have been shown to provide sufficient stimulus for farmers to participate.

PHYSICAL IMPROVEMENT OF THE IRRIGATION SYSTEM. The assurance that the agency would rehabilitate the physical facilities prior to turning over the system has, in some cases, been sufficient to get farmers to agree to take over payments for O&M and accept full responsibility for repairs. However, this rehabilitation should result in long-lasting reductions in O&M costs or improvements in water control. One-shot improvements may be an insufficient incentive to sustain WUA activity.

COST SAVINGS FROM UNWANTED PHYSICAL FACILITIES. Where farmers have input into the design of irrigation projects, cost savings may result from preventing the construction of ill-designed projects. As farmers are knowledgeable about their needs, they can help to design better irrigation facilities. As stakeholders, they can also ensure that construction or rehabilitation is done as

scheduled. In cases where farmers have a strong influence over system design, they are more willing to bear the costs of operating and maintaining their systems. In the Philippines, the lack of farmer involvement in project development led to poorly designed irrigation systems that farmers sabotaged and abandoned—a situation that was corrected in participatory programs (Wijayarathna and Vermillion 1994). Farmer-owned systems in New Zealand cut costs by reducing overelaborate engineering (Farley 1994).

MORE EFFICIENT AND RELIABLE WATER DELIVERY. Improvements in water supply if farmers take over responsibility for system maintenance and water distribution provides a long-lasting incentive for farmers to participate. Toulmin and Tiffen (1987) point out that farmers are not always after the cheapest water or energy. They may be willing to pay a higher price for reliability and convenience, and this price may include the costs of local involvement. This is particularly important in situations where the agency has proved incapable of adequate water distribution. As one WUA representative in Mexico explained: "If we don't take over, it will get worse."

CONTROL OVER WATER. Beyond adequate and reliable irrigation supplies (which either agencies or WUAs could deliver), control of water implies that WUA decisions and actions determine water deliveries. Hunt (1990) suggests that "organizational control of water" is a key variable in farmers' willingness to take part in WUA activities. Goldensohn and others (1994, p. 20) argue that when WUAs are focused on water but do not control the resource, the organizations are "emasculated from the start."

Well-specified property rights over water provide the clearest mechanism for providing WUAs with control over water, but even when full ownership of water is not conferred, WUAs exert considerable *de facto* control, as in many farmer-managed systems. WUA control is much less likely in cases where they manage only the lowest levels of the system and depend on water deliveries from main systems managed by agencies. Such situations require mechanisms to make the agency accountable to the users (Merrey 1994) and to provide WUAs with substantial input into decisions on the management of the main system. Federations of WUAs play a key role in this.

AUGMENTED FARM PRODUCTIVITY AND FARM INCOME. The potential for increased yield arising from better water delivery services and better maintenance is, ultimately, the most compelling incentive for farmers to take on expanded responsibilities in system management, particularly when the crops grown are desirable and profitable.⁶ The value of these increases must be greater than the additional costs farmers assume by active participation in WUAs.

Although the impact of improved irrigation services through WUA involvement on yields and income is one of the most tangible changes in irrigation systems, these effects are mediated by a number of other factors, such as inputs and relative prices (Small and Svendsen 1992). To deal with

6. Although marked increases in productivity have been reported as the most tangible benefit of participatory approaches, the link between productivity and farmers' involvement is not obvious, and ascribing this positive benefit solely to WUAs may be erroneous, as noted in chapter 2.

this, the Madura Groundwater Irrigation Project in Indonesia guaranteed a minimum return, and provided seeds, fertilizers, agrochemicals, and other inputs to ensure farmers' cooperation of the farmers (Jackson 1991). In other cases, the potential increases in income should be weighted appropriately to account for risk when computing the extent of gains and farmers' incentives to cooperate.

EMPOWERMENT OF FARMERS. WUAs increase farmers' ability to deal with issues among themselves as well as with agencies and other external groups. By taking on an expanded role, farmers acquire greater influence in decisionmaking on matters that affect them directly, such as the levying of water fees, the scheduling of water allocation, and the awarding or denying of water rights. WUAs provide an organized forum for communication and negotiation. Participating in WUAs can provide a "seat at the table" with agencies, as in the Office du Niger in Mali. Kolavalli (1994) reports that organized protests from informal WUAs in Karnataka, India succeeded in increasing the agency's accountability to users. This indicates that even where no formal recognition is accorded to WUAs, members can exert considerable pressure by collective action, though the costs of such action are much higher than when official recognition is given.

QUICK RESOLUTION OF WATER CONFLICTS. Asymmetry in water endowments create conflicts, because tail-enders usually get less water than head-enders. When farmers participate in major decisions that affect them, many water disputes can be quickly and amicably settled. Even when certain parties do not get what they wanted, participating in the decision makes them more likely to accept the outcome. Reducing the transaction costs—financial costs as well as social tensions—involved in dispute resolution is a powerful incentive for farmers. However, situations also arise in which farmers prefer to have an external agent involved in settling disputes so that they do not have to confront each other directly.

POSITIVE-SUM ACTIVITIES FOR THE ORGANIZATION. Distributing a fixed amount of water among WUA members and mobilizing resources from those members are at best zero-sum activities, in which gains by some members generally involve losses by others. While obtaining cooperation for such activities is possible, farmers (especially head-enders) are more likely to be interested in WUAs if they perceive that all members benefit, and if the benefit is greater than the sum of individual contributions.

Thus it is easier to gain cooperation for acquiring additional water supplies than for distributing fixed quantity of water,⁷ and for mobilizing external resources than for only raising funds from among the members. Additional water is usually brought in informally, either by enlarging an outlet or lobbying for additional water issues from the irrigation agency, but formal WUA involvement in water allocation decisions or improved maintenance of facilities can allow more formally-sanctioned increases in water supply. The value of tapping additional sources of funding from the ownership

7. Increases in the timeliness and reliability of water supply might represent another positive-sum outcome, even if the quantity of water is fixed.

of assets is an important aspect of the legal framework. Other external resources that WUAs could tap include state, NGO, or other donor assistance for system improvements.

Other positive-sum activities for WUAs lie outside the narrowly defined irrigation sector. Collective marketing of inputs or output (Goldensohn and others 1994) or guarding fields (Wade 1988) may provide an economic incentive for head-enders and tail-enders alike. Even noneconomic gains from participation, such as social cohesion or religious merit from performance of ceremonial rituals, can provide incentives for cooperation. While additional activities should not be imposed on WUAs, they can strengthen WUAs if the farmers themselves desire them and perceive them as a useful outcome of participation.

Financial Viability of WUAs

The high costs of agencies to operate and adequately maintain irrigation systems, coupled with governments' inability to recoup those costs, has been a driving force behind many programs to transfer irrigation management to WUAs. What the programs have too often neglected, however, is the question of whether WUAs will be able to raise enough resources for necessary O&M. Systems that had required considerable state subsidies for agencies to operate and maintain cannot be self-financed by WUAs unless one or more of the following conditions holds: (a) users can perform the tasks at substantially lower costs than state agencies; (b) farmers are willing to pay more to the WUA than to the state, either because service improves, because they see the link between contributions and outcomes, or because they have a say in how the money is spent; or (c) WUAs can mobilize other resources, for example, interest from accounts or rent on other assets. Unless these features are assured, Goldensohn and others (1994) point out that devolving insolvency to local government or to local communities does not solve the problem of paying for O&M and does not help to develop and strengthen sustainable, useful rural organizations.

WUAs cannot operate at a deficit. Even an annual shortfall of funds can bankrupt the organization in the early years. The likely response of WUAs (as of many agencies) is to underfund maintenance. **Financial viability of WUAs is thus critical for their sustainability and that of the irrigation infrastructure.** Thus examining the *total* costs the organizations have to bear is vital, including the costs of staff, materials, and travel to meet with government officials and the formal and informal payments that must be paid to government agencies. If the fees members must pay to meet these costs (which are often in addition to continued payments to the government) are too high a portion of their income from irrigation, the WUAs are not likely to succeed. This is particularly problematic for pump irrigation systems, in which high energy and maintenance costs exceed what the organizations are able to collect from farmers.⁸

8. Examples of financially unviable pump systems are reported in SCARP tubewells in Pakistan, the Bicol area of the Philippines (Goldensohn and others 1994), Indonesia (Johnson 1993), and Zimbabwe (Rukuni, Svendsen, and Meinzen-Dick forthcoming).

POLICY AND GOVERNANCE FACTORS

Assuming that WUAs function autonomously is too simplistic a view even for farmer-managed irrigation systems in remote areas. The role of the state is critical, especially for WUAs within large-scale irrigation systems with some form of government management (which constitute the particular focus of this study). This section examines the types of state policies that foster WUA development, and contribute to a facilitating legal framework, and the features of irrigation agencies that promote constructive interaction with WUAs.

Policy Environment

Beyond the local level and beyond the irrigation sector, state policies have a pervasive impact on WUAs. **Policies of administrative decentralization** are favorable to WUAs. Regimes that are open to voluntary activity make it easier for WUAs to operate. For example, programs to encourage farmers' participation have taken on additional momentum in Nepal since democratization. Repressive regimes are not necessarily a binding constraint, however. The program of turnover to WUAs in the Philippines was initiated under martial law, when efforts at local organization were looked on with suspicion.

Financial decentralization policies have provided a major impetus to WUA development. A greater emphasis on cost recovery from irrigation systems (instead of central or state governments providing all funds for irrigation) has led agencies to encourage WUAs to assist in fee collection. While collecting fees to turn over to the agency is not an adequate basis for sustainable WUAs, it can provide them with leverage in dealing with agencies to improve irrigation services for farmers overall (Small and Carruthers 1991). Authorizing WUAs to keep a portion of the irrigation fees to meet their own expenses further strengthens the organizations.

Water pricing policies affect the need for WUAs on the part of both the state and farmers. Flat rate charges based on area irrigated are the most common form of water pricing, especially in developing countries, largely because of administrative convenience. While improved water pricing mechanisms that reflect both the amount of water used and its opportunity cost are important for improving the incentives for efficient resource use, these have proved difficult, if not impossible, to administer in a context of large surface irrigation systems with many smallholders (Small and Carruthers 1991; World Bank 1993). Centralized agencies are generally unable to measure the amount each farmer consumes, to exclude those who do not pay, or to assess the value of water in production. WUAs have a comparative advantage by virtue of their greater local knowledge, though even WUAs have not shown great capacity for administering volumetric or efficiency pricing. Rather, wholesaling of water volumetrically from agencies to WUAs, who then collect charges from their members (with a portion of the fees going to support the organization) has shown promise in pilot projects, for example, Mohini and Mula in India (Lele and Patil 1994; Patil 1987). Such pricing policies offer potential incentives for both farmers and agencies to improve the efficiency of irrigation use through WUAs, especially as water scarcity and intersectoral competition for water resources increase.

Agricultural policies that allow crop choice and provide adequate returns to irrigated production also favor WUA development (box 4-2). If farmers are forced to grow undesirable or unprofitable crops, they have little interest in investing more time and resources in irrigation management. In Zimbabwe, the requirement that smallholders getting irrigation development loans from the National Farm Irrigation Fund must grow staple crops to be marketed through the Grain Marketing Board, rather than potentially more profitable horticultural crops, was a constraint (Makadho 1990). Conversely, in Madura, Indonesia, growing more profitable tobacco and horticultural crops instead of maize was associated with more active pump groups (Jackson 1991).

Box 4-2. Crop Profitability and WUA Success in Gujarat, India

The successful Mohini Water Distribution Cooperative in Gujarat, India, would not show a profit if it maintained the planned cropping pattern. According to Patil (1987, p. 9-11):

At present prices, the society makes a profit only if the major area is put under sugarcane. If the major area was under food grains, the society would make losses. The Mohini Society became a financial success because more than 85% of the area was put under sugarcane, instead of the prescribed 18%.

On a broader scale, relative factor prices have a major impact on farmers' incentives to invest in irrigation. Rosegrant and Svendsen (1993) note that sharp declines in world prices for the major irrigated crops of rice and wheat in the 1980s led to a decline in both major donor lending and domestic financing for irrigation development in Asia, because major expenditures on irrigation were no longer financially justified.⁹ At the same time, they note diminishing marginal returns to farmers' input use in intensely cultivated irrigated areas. It has been in this economic climate that farmers are being asked to pay a higher absolute and relative share of irrigation costs. This raises the question of the economic viability of increased payments for irrigation by farmers, particularly for staple food crops in a context of falling output prices.¹⁰ Improved terms of trade for agriculture, along with crop diversification, would increase farmers' incentives for irrigated production. However, if only horticultural or high-value crops would produce sufficient returns to cover

9. Similar difficulties with relative prices for staple foods compared to agricultural inputs (fertilizers, labor, and irrigation services) are found in many African countries.

10. Small and Carruthers (1991) report that at 1984 prices, full O&M costs would range from 7 to 36 percent of net irrigation benefits in Indonesia, Korea, Nepal, the Philippines, and Thailand, implying that "as long as irrigation facilities were performing in a reasonably satisfactory fashion, the direct benefits accruing to the farmers would generally be large enough to enable the farmers to pay for the full cost of O&M" (Small and Carruthers 1991, p. 166)." How these figures would have changed with declining output prices in the past decade is unclear.

irrigation costs, adequate infrastructure and markets (along with adequate quality of irrigation services) must be assured before WUA members will be willing and able to bear increased costs for irrigation management.

Legal Framework

Ostrom (1992a) cites "minimal recognition of the rights to organize" as a fundamental design principle for self-governing irrigation systems. This minimal level may be sufficient for organizations with little external involvement, but WUAs that interact with government agencies in more market-oriented contexts need more formal legal definitions of rights and responsibilities. Specific provisions that are generally required are described in the following paragraphs.

RECOGNITION AS REPRESENTATIVE OF IRRIGATORS IN DEALING WITH EXTERNAL AGENCIES. This formalization of user input in decisionmaking is especially important for water allocation issues and conflict resolution. Sri Lanka's inclusion of WUA representatives on project governing bodies, where they determine system opening dates jointly with the agency, is one example of this official recognition, which enhances the influence of WUA members. Conversely, Goldensohn and others (1994) report that the lack of legal recognition of WUAs in Egypt and India has limited their effectiveness in representing their members in commercial and administrative activities.

RIGHTS TO MOBILIZE RESOURCES FROM THEIR MEMBERSHIP AND OTHER SOURCES. Without these rights it is extremely difficult for organizations to cover their own expenses, let alone pay any fees to the government. In addition to the authorization to assess fees, a mechanism for the organizations to cut off water supplies or otherwise sanction those who do not pay is helpful, as is done in pump systems in Indonesia (Johnson 1993) or by user groups in Chile.¹¹

The ability to tap other resources besides members' contributions strengthens WUAs. For example, the organization in Coello, Colombia, receives 15 percent of its income from machinery rental, interest on bank deposits, and extraordinary fees (Plusquellec 1989); the Mohini Water Distribution Cooperative in Gujarat, India, rents tractor services to members (Patil 1987); informal tank irrigation associations in south India often receive income from allowing access to trees or fish in the waterspread area (Meinzen-Dick 1984); and village associations managing irrigation in south India may also earn revenues by auctioning sheep-folding rights or liquor licenses (Wade 1988). To tap these income sources, in turn, requires that WUAs have *de jure* or *de facto* ownership of the assets that generate such income. As a result, it is often only the richer organizations (such as Coello or Mohini) can diversify their income sources. Looking for alternative income sources, such as fish, trees, or herding rights, could strengthen WUAs in poor areas as well, by reducing the burden of raising all funds from member contributions and improving the organizations' financial viability.

11. Although WUAs have existed in Chile since the early 1960s, they did not have the authority to collect fees or perform many other functions until the 1976 Water Policy and 1981 Water Law Code. Gazmuri (personal communication, 1994) notes greatly enhanced activity the WUAs' authority was legally sanctioned.

ABILITY TO OPEN AND OPERATE BANK ACCOUNTS AND OBTAIN CREDIT. In most countries, formal registration as a society is required for this purpose. However, depending on the laws governing each type of society, formal registration may be insufficient. WUAs in the Madura Groundwater Irrigation Project, Indonesia, are considered to be social organizations, and therefore cannot operate bank accounts. As a result, accounts are registered in the name of the leaders. This is a potential source of considerable conflict, despite monthly monitoring of WUA accounts.

Beyond depositing money in banks, WUAs should be able to obtain credit as organizations (rather than only as individual farmers). This allows the organizations to finance system improvements or other major expenditures. Coward (1986) recommends providing credit as a form of indirect assistance to WUAs, because it allows them to select investments and take responsibility for them, while at the same time creating property for the organizations.

OWNERSHIP OF IRRIGATION FACILITIES AND/OR WATER RIGHTS. Coward (1986, p. 227) points out that property rights, which can be ownership of the actual irrigation facilities and/or water rights, form the basis for relationships among the irrigators, which "become the social basis for collective action by irrigators in performing various irrigation tasks." In communal irrigation systems in Indonesia, Nepal, and the Philippines, those who have contributed system construction or extension own shares in the system's infrastructure and water rights, along with corresponding responsibilities for ongoing maintenance (Yoder 1994). Formal turnover of ownership rights to a system when WUAs have made a certain level of equity contribution or met other requirements has become a cornerstone of many management transfer programs (box 4-3): The president of the Dominican Republic personally presided over the transfer of irrigation system titles to WUAs to demonstrate the government's commitment to the program (NESPAK 1994). In addition to strengthening the WUAs, ownership of the facilities increases local incentives to maintain them. WUA ownership of water rights as in Chile or New Zealand is less common, but allows the organizations to make allocation decisions, and can provide incentives to conserve water if the water savings can be turned into economic benefits, either through expanded area or cropping intensity or the sale of surplus water.

Box 4-3. Turnover of Water Rights and System Infrastructure in Mexico

Mexican civil associations receive both a water concession title and a right of use of the hydraulic infrastructures. In addition to providing the associations with secure rights, these documents specify a list of users; an inventory of facilities turned over; the conditions under which they are turned over; the operation, maintenance, and administrative regulations of the associations; and clear specification of the obligations of both the users and agency. Gorriz, Subramanian, and Simas (1995).

Property rights are not, however, a sufficient condition for collective action. Farmers in India and Pakistan often do not acknowledge ownership of watercourses because they do not value the

property and did not participate in its creation or financing. If the costs of organization exceed its benefits, secure property rights will not increase incentives to organize.

Provisions for monitoring the leadership should preferably call for the monitoring to be done by members of the organization, but in some cases it is useful for them to be able to call on external authorities. The legal sanction given to decisions made by the general assembly of Japanese WUAs, for example, can reinforce internal monitoring (JNCICID 1994). A lack of mechanisms for monitoring finances—with minimal records kept—is a source of considerable distrust and dissention in Indonesian pump groups studied by Johnson (1993). However, complex external auditing requirements that members do not understand are also problematic.

Rights, even preferential rights, for WUAs to bid on externally-funded irrigation improvement works in their area not only provide a source of initial funding for WUAs, but can also provide valuable experience in working with the irrigation infrastructure and with the agency. Dayaratne (1991) cited bureaucratic procedures that prevented the farmers from being awarded any of the contracts for construction work as a major shortcoming of the Village Irrigation Rehabilitation Project in Sri Lanka. However, it has now become Irrigation Department policy to contract improvement works to farmers where they are willing to take them on, but these are often taken up by leaders as a way to earn money, rather than involving other members in the process. Similarly, Bruns and Dwi Atmanto (1992) cite difficulties in combining farmers' labor and in-kind contributions with agency-funded system improvements, and stress the need to have contractors meet with farmers as well as with agency staff before beginning work.

Contracts between WUAs and the state agency (as in the Philippines) or between WUAs and other agencies such as engineering companies (as in Chile) are useful, because they spell out the rights and obligations of each party. In addition, but beyond clarifying their relative roles in joint management situations, contracts place WUAs on an even footing with agencies. Contracts imply voluntarism and equality between contracting parties, two features that are often missing in government dealings with local organizations. However, for this to work, the WUAs must be able to hold the government to its side of the contract, which requires enforceable sanctions if the irrigation agency does not fulfil its obligations—a condition that is often absent (Merrey 1994).

Excessive legal regulation of WUAs stifles local initiative and organizations' ability to adapt to local conditions. They should therefore have some scope for flexibility. Wherever possible, mandated requirements (especially those regarding organizational structure and by-laws) should be kept to a minimum, allowing members to tailor the organizations to their own objectives and local conditions. Without this flexibility, WUAs have little comparative advantage over central agencies in terms of acquiring relevant local information about the irrigation system. Moreover, farmers will find it harder to understand complex legislation and regulation of the organizations. Existing laws, such as those governing cooperatives or nonprofit organizations may be appropriate for WUAs. They should be examined to determine the consistency of objectives with WUAs, the complexity of their regulations, and the feasibility of enforcement to determine their suitability (box 4-4).

Above all, legislation affecting WUAs must provide a facilitating framework, not a repressive one. This requires balancing requirements or responsibilities with rights of the organizations' rights.

Box 4-4. Legal Framework for WUAs in Pakistan

The WUA ordinance in Pakistan's Punjab province provides an example of a legal framework that does little to empower or encourage WUA members. The only objectives of the organizations that are listed are the government's objectives, rather than the farmers'. WUAs must adopt a standard set of by-laws in order to be registered, and WUAs have no right to appeal if government officers refuse to grant them registration. Little information about the ordinance is available in the local language, nor is the content of the law widely known. It is thus not surprising that most WUAs have little farmer participation, and that they ceased to be active once initial watercourse lining was completed. Byrnes (1992).

Agency Structure and Incentives

Like most of the literature on local organizations for natural resource management, this paper has focused on the organizational structure of WUAs. Too often the capacity and willingness of agency staff to work with WUAs in irrigation management are assumed to exist. Yet agency structure and incentives are crucial for the success of WUA development efforts, particularly in the context of joint management.

Because government agencies and farmer involvement are substitutes in many O&M activities, the greater the competence of agencies, the less the apparent need for WUAs. Well-run, agency-managed irrigation systems in, France, Hong Kong, Malaysia, or Morocco, for example, create little incentive for farmers to take over management. Unless the agency's costs are so high that they cannot be recouped through water charges and create unsustainable revenue drains on the government, for the agency to continue operating the systems may be more efficient. More commonly, deficiencies in system management have prompted farmers to organize and take over functions that the agency was not carrying out properly. These situations are not so much a turnover of management responsibility from agency to WUAs as an abdication of responsibility by the agency and a takeover by farmers (see box 4-5).

Box 4-5. Farmer Takeover of System Management in Mexico

Even before the national policy of management transfer in Mexico, a group of farmers in western Mexico organized themselves into a group known as the *faena*. When they got no response from the agency to requests to enlarge their water inlet, they collected funds and carried out the work. Thereafter, the farmers reported that "We simply say that it is now our canal and that we do not allow them [agency staff] to enter" (van der Zaag 1992).

While agency management deficiencies at the lowest levels of system operation can stimulate WUAs to take on a greater role, management deficiencies at critical higher levels of the system reduce the benefits of WUA activity at lower levels. At the same time, in the absence of explicit policies (such as Mexico's) to transfer irrigation management authority at higher levels from agencies to WUAs, the users' organizations will not be able to fill the void created by agency mismanagement. Thus, agencies that can deliver reliable water supply in the main system, but not to every field, create the most conducive conditions for WUA activity.

Unfortunately, in most agencies the incentive structure is not set up to optimize WUA activity. **Transparency and accountability**—features that are attractive to farmers in their own organizations as well as in agencies—are not part of the institutional culture of most irrigation agencies (Merrey 1994). Efficient main system management and organized users both threaten rent-seeking, which may be an important source of income for agency staff (Repetto 1986; Wade 1982b). As in extension tasks, agency staff generally perceive community mobilization as an added responsibility, and may not give it as much attention as other tasks because its impact is not immediately apparent, or because they are not adequately compensated for organizing community participation. Management transfer programs that aim to expand the role of WUAs to reduce the size and costs of agency staffing threaten the jobs and basic salaries of agency staff. Finally, because most irrigation agencies are traditional engineering organizations, the professional rewards lie in the design or efficient implementation of physical projects, not in routine O&M or in dealing with farmers' demands.

In many countries, the major stimulus for transferring management responsibility from agencies to WUAs is to alleviate fiscal pressures arising from mounting O&M costs. For example, pump schemes of less than 500 hectares in Indonesia were transferred to farmer management to cut down the subsidy to irrigation, estimated at US\$606 to US\$788 million per year (Johnson 1993). In the Philippines, inadequate funding from local sources, exacerbated by shrinking contributions from donor agencies to support O&M costs and declining revenues caused by farmers' failure to pay irrigation fees, prompted the shaping of a national policy to transfer systems to farmers (Wijayaratra and Vermillion 1994).

As powerful as the financial pressures on the government may be, as Wade (1994) argues, they are unlikely to affect the behavior of agency staff without structural changes that convey the appropriate incentives. The incentives for agencies to work with WUAs are described in the following paragraphs.

FINANCIAL AUTONOMY. Tying the agency's budget to farmers' contributions creates a reward system conducive to stimulating community participation. The effects of irrigation fees on the attitudes and performance of agency staff depend on whether the agency is financially autonomous or whether it is centrally financed by the government. Small and Carruthers (1991) argue that financially autonomous agencies will be more efficient at obtaining better irrigation performance. Eliminating all irrigation subsidies is neither necessary nor sufficient to create better incentives for agency staff. Some level of subsidy is consistent with financial autonomy, provided the amount is fixed and service fees must still cover the bulk of expenses. Financial autonomy is found in the Philippines (with the centralized National Irrigation Administration) and in Korea (with the decentralized farmland improvement associations). Because the agency's budget, including, ultimately, the salaries of its staff, depends on collecting service fees from farmers, the staff of financially autonomous agencies have a greater incentive to work with farmers to provide adequate irrigation service. Furthermore, financially autonomous agencies will be able to supplement irrigation fees with secondary income from interest on deposits, the sale of water for nonagricultural purposes, or the rental of assets owned by the agency (Small 1990).

SALARIES. Incentives for management transfer must carry through not only from the central government to the agency's structure, but also from the agency to the staff who carry out the actual work. In the Philippines, as a financially autonomous agency NIA was able to offer higher salaries to its staff than the regular civil service allowed. However, this was contingent upon maintaining a balance between expenses and cost recovery, which gave staff an incentive to work with WUAs to reduce the agency's costs and raise irrigation service fees. Staff salaries are also affected by the system's performance and by fee collection rates (Bagadion 1994).

PERFORMANCE EVALUATION CRITERIA. Including working with WUAs in the job descriptions and performance evaluations of agency staff is essential for improving their incentives for joint management of irrigation. Supervisors need to monitor work with WUAs and, if possible, obtain feedback from farmers on how helpful staff members are. Paul (1994) notes that publicizing agencies' performance plans among users strengthens accountability.

While the number of associations registered is relatively easy to measure, it is not, in itself, a good indicator of how well staff have been working with WUAs, because it does not take into consideration how well the WUAs and joint management work. Fee collection rates from farmers or WUAs may provide a better indicator of farmers' satisfaction with the joint management. Meetings of field staff involved with WUAs not only provide an effective monitoring mechanism, but help the staff to solve problems.

Professional satisfaction and nonmonetary rewards: These are less tangible, but can provide a powerful motivator for agency staff. For many conventional engineering staff, the rewards are

greatest for design and construction, for working with stone and cement rather than with organizations and people. These attitudes will change if staff see that promotions, raises, and special honors go to those who work well with farmers. In Nepal, for example, the king awarded a special medal to an Irrigation Department engineer who had made extraordinary efforts to help a WUA become established under difficult conditions. In addition, greater professional satisfaction is possible as agency staff devote more time to challenging new roles such as monitoring and regulation, rather than to more mundane O&M at lower levels of the system. In Indonesia, Bruns and Dwi Atmanto (1992) report that many agency staff assigned to work on system turnover activities found working with farmers more enjoyable than their previous responsibilities, which mostly involved keeping records.

REDUCED TRANSACTION COSTS. A reduction in the number of conflict cases (or "hassle factors") agency staff have to resolve has also proved to be a valuable incentive for working with WUAs. Establishing WUAs as organized forums for communication can reduce transaction costs for agencies as well as for farmers. Reduced damage to structures as farmers develop an incentive to protect system facilities eases the burden placed on field staff. Just as agency staff may have to devote less time to making field visits, the turnover of management to farmers often results in fewer farmer complaints, and thus less need to deal with individual farmers' demands as WUAs take on additional roles (Merrey and Murray-Rust 1991). In Chile, farmers no longer politicize problems with the state management of irrigation since users' associations have become established (Gazmuri, personal communication 1994).

Structural changes such as establishing financial autonomy and linking salaries and performance appraisals to work with farmers generally create the strongest and longest-lasting incentives to work with WUAs. Less tangible incentives, such as personal satisfaction and reduced conflict, are more likely to emerge once agency staff gain experience with WUAs. **In all of this, a strong commitment from government policymakers and senior agency management will reinforce the need to establish positive collaboration between irrigation agency staff and irrigators.** In this way, complementarities between the capacities and roles of agencies and WUAs can be developed that benefit both the government and farmers.

5. STRUCTURE FOR WUA-AGENCY INTERACTION

As suggested in chapter 1, empirical examples of full farmer management and full agency management are both becoming rarer. Part of this is due to our increased understanding of the relationships between agencies and farmers. Studies of agency-managed systems have shown that some form of WUA often plays an important role in water and system management. At the other end of the spectrum, many farmer-managed systems receive government support in establishing and adjudicating water rights, constructing and rehabilitating costly irrigation works, and providing continued training and extension services to farmers.

Policies to assist traditional irrigation systems and to transfer management responsibility from agencies to WUAs have further reduced the number of cases of "pure" agency or farmer management. The state bureaucracy has a continuing and important role to play in administering irrigation resources, even in cases where organizations have achieved sovereignty over all aspects of irrigation management. Of course, as local management capacities are strengthened and they become more competent, the nature of the state's job will change from control to assistance. However, state assistance to WUAs and the provision of a facilitating environment should be seen as a continuing, rather than a one-shot or short-term project activity. **This chapter lays out the range of options for state-farmer partnership in irrigation and the implications of increasing the role of WUAs.**

OPTIONS FOR JOINT MANAGEMENT

In between the extremes of sole agency or sole farmer management lie many forms of **joint management**. Although variations abound, categories of joint management (ranked from greatest degree of agency control to greatest degree of WUA control) can be identified as

- Full agency control;
- Agency O&M, user input;
- Shared management;
- WUA O&M;
- WUA ownership, agency regulation;
- Full WUA control.

These options are based on which entity (agency or WUA) has responsibility for or control over regulation, ownership, operation and maintenance, and user representation, as illustrated in table 5-1.¹ **Full agency control** is the reported management form in many countries, particularly at higher

1. Note that this does not indicate who fulfills each of a full range of irrigation activities (as specified in Uphoff, Meinzen-Dick, and St. Julien 1985). These include water use activities (acquisition, allocation, distribution, and drainage); control structure activities (design, construction, operation, and maintenance); and organizational activities (decisionmaking, resource mobilization, communication, and conflict management). The emphasis here is on the degree of control agencies

levels of system management. However, such full control is increasingly scarce in practice, because users often have some form of representation or input, however informal. Thus, **agency O&M responsibility and user input** is the more common form of joint management. Under **shared management**, WUAs represent users and have some O&M responsibilities, while agencies continue to have O&M responsibilities, along with system ownership and a regulatory role. **WUA O&M responsibility** is the objective of many management transfer programs, though agencies continue to own the systems and have a regulatory role. **WUA ownership** implies that they are also responsible for O&M and user representation, while agencies continue to have a regulatory role. **Full WUA control**, including regulation, is rarely found in practice, except in more isolated regions where the state's presence is less effective.

Table 5-1. Joint Management Options

| Activity | Full agency control | Agency O&M, (user input) | Shared management | WUA O&M | WUA ownership (agency regulation) | Full WUA control |
|--------------------------------|---------------------|--------------------------|-------------------|---------|-----------------------------------|------------------|
| Regulation | Agency | Agency | Agency | Agency | Agency | WUA |
| Ownership of structures, water | Agency | Agency | Agency | Agency | WUA | WUA |
| O&M responsibility | Agency | Agency | Both | WUA | WUA | WUA |
| User representation | Agency | WUA | WUA | WUA | WUA | WUA |

User representation offers farmers a means of providing input into irrigation management decisions. This is one of the first steps in increasing WUA participation. The major areas for such consultation are in system design and water allocation. WUA input ranges from informal lobbying on the part of farmers (which agency staff often see as interference), to formal consultations and legally binding meetings between agency staff and WUAs (as on Sri Lankan project management committees), and even veto power for WUAs on critical decisions (such as siting or the layout of facilities). **While representation and input are important, and may even be key incentives for farmers to participate in WUAs, they are ephemeral unless explicit provisions are made for meetings between WUAs and agency staff, or unless some form of sign-off mechanism exists by which WUA agreement is monitored.** Many systems and transfer programs mention some form of user input mechanism as a first step, but never move beyond this, as in Fiji, where farmers are

and WUAs exercise.

consulted on system design, but no tangible roles were assigned for WUAs after construction (Biakula 1991).

Operation and maintenance responsibility is one of the most widely shared functions between agencies and WUAs. In some cases O&M responsibilities overlaps which can be termed shared management. Such cases arise either when farmers spontaneously fill roles that the agency is formally responsible for, or as part of management transfer programs that plan for a period of O&M training for WUAs by having farmers work alongside agency staff before full responsibility is turned over to them. Shared management can be used to build a stronger relationship between agency staff and WUA members, but is usually a transitory phase that leads to a more specialized designation of responsibility for each party.

Arrangements for shared O&M activities should include a clear specification of what tasks the agency and the WUAs are each responsible for. This is needed to clarify expectations and ensure that critical tasks are not neglected because they are in neither party's domain. **Contracts** between the agency and farmers are particularly desirable because they specify the rights and responsibilities of both parties, along with the sanctions if either fails to fulfill its obligations (box 5-1). Moreover, the use of contracts implies a relative equality between contracting parties, as opposed to government orders, which generally place WUAs in a subordinate position to agencies.

Box 5-1. Successful Use of Contracts in Bangladesh

The Barind Integrated Area Development Project (BIADP) in Bangladesh used a deed of agreement between BIADP and the Barind Deep Tubewell Water Users' Association. Under this, farmers pay an irrigation charge and the management of the project guarantees water supply. The farmers are also responsible for the usual maintenance costs and the fuel, oil, and electricity for the pump. The project bears the servicing cost and owns the pump. The BIADP calculated the water charge in such a way that it would cover the cost of the equipment by the end of its expected lifetime, and charges must be related to the extra income (made possible by using the equipment) earned by the farmer. The good performance of this project can be seen in the increase in the irrigated area per cusec of discharge and the percentage of costs recouped (Asaduzzaman 1989).

Traditionally, the literature has focused on the *principal-agent* relationships between government authorities and local users. The government agency (the principal) is faced with trying to control the unobservable actions of the farmers (the agents). Seabright (1993) proposes use of the same framework, but with reversed roles: the agency's employees (agents) write their own contracts and the local farmers (principals) have more or less veto power.

Shared management offers the opportunity to improve farmers' control over water supplies, which is a powerful incentive for participation in WUAs (Hunt 1990). By taking part in system

management activities and entering into binding contracts with the government, WUAs have greater influence over the quality of irrigation services. Unless the benefits of such increased control over irrigation can be demonstrated, WUAs are likely to see shared management as an obligation that they have little incentive to fulfil.

Ownership of irrigation system assets provides a clear combination of rights and responsibilities. The most important types of irrigation property include structures, equipment, water, and other assets (such as fish or trees). Ownership is based on investment in at least part of the capital costs, and implies a commitment to bearing the property's full recurrent costs. At the same time, it provides greater control over the property and the rights to earn income from it, which improves incentives for management. While in most cases the state claims ownership of both the facilities and the water rights, WUA ownership is found in many traditional farmer-managed systems. It is also incorporated into an increasing number of turnover programs, through which the state transfers formal rights to the system to WUAs after the users have met specified equity contributions and have agreed to take on full responsibility for costs and management thereafter. Even where WUAs do not have full ownership of water and facilities, they may have rights that are sanctioned by laws or by local customs.

Although the common irrigation property provides a strong bond among WUA members, few states have been willing to give WUAs clear ownership rights. In many cases this is because states are reluctant to give up ownership of infrastructure or of crucial water rights, particularly if the infrastructure was created using public funds. Providing local organizations with ownership is also risky because true ownership implies that the owner can modify, or even dispose of, the property (subject to some degree of regulation). Moreover, if the owners do not maintain the system to proper standards, external groups cannot easily step in to fix them without undermining the owners' authority and incentives. If, however, the state owns the property and does not maintain it, WUAs and users have little formal recourse to correct problems.

The assignment of property rights to WUAs as a management transfer strategy can increase local responsibility and incentives for irrigation system O&M. Where it is in feasible—for practical or political reasons—to give WUAs ownership, assigning clear rights (such as the right to exclude others or to make binding decisions) should be pursued as a way to strengthen the WUAs and their effectiveness in system management (box 5-2).

Regulation refers to monitoring and intervention to prevent negative externalities. It includes setting water allocation or settling water disputes between units of an irrigation system, ensuring equity by offsetting local elites' attempts to monopolize the organizations or the benefits of irrigation, monitoring third party effects (such as water table levels), and handling intersectoral water distribution. For more detail on the regulatory functions of government agencies see Frederiksen (1992).

Box 5-2. Ownership of Small-Scale Irrigation Systems in Indonesia

Although farmers originally built and managed most small-scale irrigation systems in Indonesia, the government required that systems receiving any amount of government financial assistance must become government systems. When declining oil revenues in the 1980s precipitated a fiscal crisis for the government, it began to withdraw from state involvement in irrigation O&M. Under the turnover project begun in 1987, a major question was

Whether to transfer ownership of the assets to farmers or only transfer authority to manage the system. If the assets continued to belong to the government then the irrigation officials would continue to be ultimately responsible for them and liable if problems occurred. Authority and responsibility would not match, and turnover would not represent a significant change from existing policies where farmers were already in theory responsible for operation and maintenance of tertiary areas (Bruns and Dwi Atmanto 1992:4).

The project used turnover ceremonies to acknowledge and publicize WUA ownership of facilities, although the government retains ownership of the actual water resources.

The state's regulatory role remains at some level, even in the most complete examples of management transfer. The inherent features of rivalry and nonexcludability of water resources imply that optimal allocation can only be achieved through state allocation. Restricting the use of irrigation to payees may be costly (assuming it is even possible), because water is mobile.² Water seeps, permeates, and evapotranspires at various rates, so that limiting its availability to payees is often untenable. Even if the government seeks private sector involvement, it has to enforce some pricing regulation or enact other control mechanisms to ensure that competitive forces remain active. Therefore, there is scope for partnership between the state and farmers in achieving efficient allocation and consumption of irrigation (box 5-3).

SYSTEM LEVELS

The allocation of functions between agencies and WUAs also varies between levels of the system. A great degree of agency control is generally found at higher levels of the system, with a greater WUA role at lower levels. However, the exact division of responsibility varies widely between countries, and even between systems, as illustrated in table 5-2.

2. Some technologies permit cutting off water to those who do not pay, such as the adjustable gates used in Chile, but this requires strong institutions for monitoring and enforcement.

Box 5-3. Continuing Role of the State in Chile

Users' associations in Chile have been empowered and have taken on a wide range of functions, but the state's role remains clearly defined in performing adjudication functions, such as in cases where applications for water rights involve a natural water source, and in resolving highly controversial internal conflicts, as in reaching agreements regarding the allocation of water during extended dry spells. Even when the state is not called in on disputes, the potential for state intervention is influential in persuading users to reach agreement (Gazmuri, personal communication 1994).

Table 5-2. Joint Management Options by System Level, Selected Cases

| Country | Full Agency Control | Agency O&M, (User Input) | Shared Management | WUA O&M | WUA Ownership, (Agency Regulation) | Full WUA Control |
|-----------------------|---------------------|--------------------------|-------------------|---------|------------------------------------|------------------|
| Bali, Indonesia | | | | | | RB |
| Mexico | RB | MS | SS | SS | SS | DL |
| New Zealand | | | | | MS | SS |
| Pakistan | SS | DL | | WC | | |
| Philippines, communal | RB | | | MS | MS | SS |
| Philippines, national | RB | MS | | SS | | WC |

Note: Because the table refers to specific cases rather than presenting a random sample, it is illustrative, not a representative distribution of joint management types.

RB river basin, MS main system, SS subsystem, DL distributary/lateral, WC watercourse.

At the **river basin level**, where multiple systems are involved, the state almost always plays a major role with little, if any, user involvement. The one notable exception is found in Bali, Indonesia, where traditional management by temple priests coordinates water allocation among *subaks* within the basin (Lansing 1989). At the **main system level** users may have input in decisionmaking (for example, in system design in Fiji or in water allocation in Sri Lanka), but the agency retains a strong regulatory, ownership, and O&M role. Some smaller systems, such as the communals in the Philippines or Nepal, recognize WUA ownership of even the main system. Shared management is frequently found at the **subsystem** or **distributary level**, either through planned sharing of O&M responsibility or through farmers informally taking on some tasks. Management transfer programs in larger systems have generally provided for eventual WUA ownership and O&M responsibility only at the subsystem or distributary level.

Below the lowest outlet, at the **watercourse level**, agency involvement is usually minimal, except under occasional improvement projects, such as India's Command Area Development or Pakistan's onfarm water management programs. Even these projects often aim to have farmers invest in, own, and maintain the tertiary-level facilities. Unfortunately, unless the farmers have been adequately involved in the design and construction process, they often do not acknowledge ownership of or ongoing responsibility for the watercourses, and unless they have some degree of control over water deliveries from the main system, ownership at the watercourse level has little value.

Most programs to transfer management responsibility from agency to farmers encourage WUAs to take on expanded roles. The formation of federations of WUAs raises the level at which each joint management option is found, as WUAs take on roles at higher levels of the system. The combined effect is to concentrate agency resources, instead of spreading them more thinly over the full spectrum of functions and system levels. This is supposed to lead to more effective agency performance of the remaining tasks. At the same time, WUAs are expected to take on more tasks at more levels. The question of whether WUAs will have adequate capacity and incentives to perform these tasks needs to be ascertained.

6. CONCLUSIONS

The analysis of water user associations in this paper is based on the premise that strong local organizations have an important role to play in the achievement of high levels of irrigation system performance. But what leads to strong WUAs and what are the policy factors that can assist in the development of such organizations? This chapter reviews the key lessons identified in this paper relating to (a) internal structural features of WUAs that improve their effectiveness; (b) external factors that affect the viability and sustainability of such voluntary local organizations in irrigation management; and (c) implications for constructive interaction between irrigation agencies and WUAs, particularly for irrigation management transfer programs.

- WUAs are stronger if they can build upon existing social capital or patterns of cooperation. Working with existing successful organizations wherever possible is therefore advantageous. Where none are operating, trained institutional organizers can serve as catalysts. Whether existing or new organizations are involved in irrigation management, the organizations must be adaptable, both local conditions and to changes over time.
- Groups are likely to be stronger if they are relatively homogeneous in terms of background and assets. However, heterogeneity is manageable (or even, in some instances, desirable), and defining membership to include all stakeholders, including tenants and women, improves equity.
- There is no single optimal size for WUAs. As size increases, transaction costs increase and it becomes more difficult for members to monitor each other. However, larger groups can also achieve some economies of scale and take on more tasks in irrigation management. Federation of WUAs allows the organizations to expand and operate on a larger scale, while still maintaining manageable interactions among members of base-level groups. Researchers have shown that this is critical for real user involvement in large-scale irrigation systems.
- The structure of and roles within WUAs depend on the degree of commercialization and market penetration. With market penetration, WUAs replace direct labor or in-kind participation by all members by hiring specialists. This, together with the development of nonirrigation infrastructure, reduces transaction costs and allows the organizations to expand in size. However, it also creates a much greater need for accountability of leaders and employees to the membership.
- Although the range of WUA organizations shows great variability, two broad models of WUAs can be identified. The first, or Asian, model typically relies on direct participation by all members. Base units are likely to be smaller. These are often socially-based, multipurpose organizations that build upon members' daily interactions and knowledge of each other for decisionmaking, monitoring, and sanctioning. They are likely to be most appropriate in socially cohesive societies with smaller landholdings, low market penetration, and simpler irrigation technology. The second, or American, model is a more specialized organization with role differentiation. The specialization, together with less reliance on face-to-face interactions, allows for larger organizational size. Membership is more likely to be based on hydraulic boundaries,

and the organizations focus on irrigation rather than on multiple activities. Formal rules and supervisory bodies form the basis for decisionmaking, monitoring, and sanctioning. Such organizations are appropriate where landholdings are larger, market development is greater, and technology is more complex.

- In any type of WUA, the benefits to farmers must outweigh the costs of participation. This applies at both the farmer and the enterprise level.¹ For the farmers, benefits of physical system improvements, improved water supply, increased farm income, empowerment, and conflict resolution obtained through WUAs should offset the substantial time, materials, cash, and interpersonal transaction costs of being active in local irrigation organizations. This requires that irrigated agriculture be profitable enough to create a demand for water, and that WUAs have a demonstrable effect in improving farmers' control over irrigation water.
- Organized farmers in WUAs can manage advanced technology and higher levels of irrigation systems. Their expanded role in main system management through federations of WUAs can provide a greater degree of control over water supplies, which is a major incentive for farmers to participate in WUAs. However, they often require external support and training as they take on increasing levels of responsibility.
- A supportive policy and legal environment is crucial to the sustainability of WUAs. State policies of administrative and financial decentralization have provided the impetus for many management transfer programs that shrink the role of the state and expand the role of WUAs.
- Where agencies retain operation and maintenance responsibilities at higher levels of the system, they need to carry out these roles effectively so that farmers will feel it is worthwhile for WUAs to carry out their functions at lower levels. Developing a service orientation among agency staff and a collaborative attitude between agencies and WUAs is essential for successful joint management of irrigation systems and for management transfer programs. Strengthening agency accountability to users by making inform irrigation plans and programs public and providing financial autonomy for irrigation agencies to rely on user fees for their budgets are strong incentives for agencies to foster WUAs.
- A facilitating legal framework is critical to give WUAs the ability to deal effectively with external groups, operate bank accounts, and undertake other activities. However, the legal framework must be flexible enough to allow members to adapt their organizations to local circumstances. It must also balance rights with responsibilities for WUAs in order to ensure that members have sufficient incentives to participate. Clear assignment of property rights over water and over the physical infrastructure of irrigation systems to WUAs can be a potent tool for strengthening the organizations, and should be given greater attention, particularly in programs

1. The benefits of reduced state expenditure on irrigation may be important to governments, but they are unlikely to be valued by farmers or even by agency staff unless they are translated into appropriate incentives.

that aim to transfer the responsibilities for and the costs of irrigation system management from the state to users.

- The state has essential continuing role in ensuring the long-run sustainability of WUAs. Although the appropriate role for the state changes as WUAs take on additional responsibilities, government support should continue. Particularly important roles for the state are establishing and adjudicating water rights; monitoring and regulating externalities and third party effects of irrigation maintaining a supportive legal framework for WUAs; providing technical and organizational training and support to WUAs; and occasionally providing design, construction, or financial support for major rehabilitation activities.

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APPENDIX 1. THE IMPACT OF WUAS ON IRRIGATION PERFORMANCE

Farmers' participation in irrigation management emerged as a policy alternative for many governments in developing countries during the 1980s. Starting with the reported success of the irrigators' associations in the Philippines, the participatory approach to irrigation management was replicated in various countries in Southeast Asia, South Asia, and Latin America. Yet the literature contains relatively little documentation of their achievements.¹ As success stories of water user associations (WUAs) are reported in numerous parts of the world, recording their accomplishments becomes increasingly important so as to derive lessons for possible replication elsewhere.

This appendix reviews the performance consequences of organized user participation in irrigation management worldwide. While greater farmer participation may be an objective in itself for some cases, in most cases the development of water users' associations is not an end in itself, but a means toward improving the performance of irrigation.

HOW IS PERFORMANCE MEASURED?

The success of WUA involvement in irrigation systems is closely linked to the degree to which established objectives (both from the agency perspective and the participating farmers' group) of the system are achieved. This review focuses on four broad categories of performance indicators typically used in the literature, namely:

- Technical impact (water availability, equitable distribution, expansion in irrigated area, efficient delivery of water, and improved upkeep of systems);
- Productivity impact (the tangible benefits of increased yields, intensified cropping patterns, and improved farm incomes);
- Financial impact (reduced irrigation costs and increased cost recovery);
- Environmental and other nontangible impacts (changes in water quality, waterlogging and salinity, groundwater tables, and other externalities that result from farmers' participation).

Technical Impact Performance Indicators

FARMERS' PARTICIPATION IMPROVES WATER DELIVERY SERVICES. A frequently used measure of success in systems that have adopted a participatory approach is the efficiency by which water is delivered to beneficiaries. Water is a critical determinant of viable crop growth, and in many parts of the world where rainfall is unevenly distributed and dry spells occur frequently, the careful management and distribution of the water supply is important in farmers' production decisionmaking. Farmers, therefore, have stronger incentives to obtain and distribute water than

1. The notable exception which has been relatively well documented is the case of the Philippines (Bagadion and Korten 1991; de los Reyes and Jopillo 1989; Svendsen 1992).

most agency staff. As farmers compete for this subtractable resource, they must bargain to decide on allocation, and then implement these allocation decisions. Farmers can better assess their needs and have more information about other farmers' water needs than the agency. They also have lower transaction costs in finding the optimal allocation. The result is often more flexible allocation patterns that are adapted to local needs.²

WUAs are instrumental in coordinating rotational water delivery among members and in assuring that all farmers will receive their turn. Experience in the Philippines showed that rotational irrigation through WUAs is effective in irrigating wider farm areas, alleviating intertemporal water shortages, and ensuring the timely delivery of adequate water to areas where it is needed (de los Reyes and Jopillo 1989). Rotational irrigation introduced through WUAs in the Pochampad irrigation system in India permitted a 25 to 35 percent extension of the irrigated area (Singh 1983).

Improved efficiency of water deliveries (reduced water losses) saved 25 to 30 percent of irrigation supplies after the WUA took control in Azua, the Dominican Republic. This, in turn, reduced the need for drainage and related investments (NESPAK 1994). In Nepal, water is more efficiently distributed in smaller farmer-controlled systems during the wet season than in larger systems (Shivakoti 1992). More equitable water distribution has been a positive attribute of farmer-managed pump systems in Bangladesh (Hakim and Parker 1993) and of the introduction of WUAs in Gal Oya, Sri Lanka (Uphoff 1986).

FARMERS' PARTICIPATION RESULTS IN EXPANDED AREAS UNDER IRRIGATION. As a result of better water management and allocation, wider areas are irrigated in community-managed systems than in state managed systems. In the Philippines, for instance, the area irrigated under the participatory systems expanded by 35 percent, which is nearly twice the rate accomplished in nonparticipatory systems (de los Reyes and Jopillo 1989). Uphoff (1992a) reports that one outcome of WUA organizational efforts in Gal Oya, Sri Lanka, was that head-enders were willing to reduce their water consumption to send water to the tail end of the system, thereby increasing both the area irrigated and the equity of water deliveries.

FARMERS' PARTICIPATION REDUCES PREMATURE DAMAGE TO FACILITIES. Part of the condition for turnover is the transfer of maintenance and repair responsibilities to WUAs. To provide adequate water to their members, WUAs are likely to pay more attention to maintaining the canals and headworks. Farmer members in Taiwan carry out routine patrolling and inspections to ensure the proper upkeep of systems (Lin 1991). Technicians hired by the users' association do regular "policing" in Chile. Because they are in direct radio contact with farmers, problems can usually be corrected within an hour, compared to weeks of bureaucratic delay under agency management (Gazmuri, personal communication 1994).

2. Although Baland and Platteau (1994, chapter 4) argue that bargaining solutions are not a second-best allocation when asymmetries in information exist, an allocation schedule determined through farmer participation should still be a more efficient allocation than an allocation determined by the agency only.

Moreover, because farmers have a vested interest in the facilities and will have to pay for any repairs, they are less likely to damage structures for which WUAs are responsible than those under agency management. The Tank Renovation Project of the National Development Foundation in Sri Lanka noted that farmers who had damaged facilities began taking greater care of them after they were organized into water groups with a common interest in the irrigation system (Dayaratne 1991). For a similar experience in Gal Oya, Sri Lanka, see Merrey and Murray-Rust (1991).

Output Performance Indicators

Farmers' participation augments productivity and farm returns. Investigators have cited increased yields as another benefit of participatory irrigation operations, although documentation of the size of these productivity gains is scanty. Comparing the performance of participatory and nonparticipatory systems before and after the assistance of NIA, de los Reyes and Jopillo (1989) found a statistically significant increase in rice yield with participation. They also observed that farmers in participatory systems used more inputs, which de los Reyes and Jopillo (1989) speculated was due to farmers' "stronger sense that they would receive their fair share of water."³

Improvements in productivity have likewise been stimulated by farmers' expanded involvement in irrigation management in small, farmer-managed systems in Nepal (Shivakoti 1992). Cropping intensity in farmer-managed systems in selected *gezirahs* along the River Nile in Egypt is about 300 to 350 percent, compared to 200 percent in centrally-operated systems, average gross returns per *feddan* (in Egyptian pounds) in the former are about three times higher than in the latter (Metawie, Nasr, and Rady 1993). However, it is difficult to determine how much of this change is attributable to the WUAs, and how much to changes in physical systems or water supply under improvement projects. Among informal tank irrigation associations in Tamil Nadu, India, the activity of WUAs resulted in increased expenditure on channel cleaning and maintenance that, in turn, had a significant impact on paddy yields during drought years (Palanisami, Meinzen-Dick, and Svendsen 1994).

Financial Impact Performance Indicators

Farmers' participation is cost saving. The most tangible and well-documented gain from farmers' involvement in irrigation is the reduction in government costs. These cost savings come from reduced administrative and operations costs as the number of staff fielded decreases, better project design, increased fee collection rates, and decrease in the destruction of facilities. Numerous country experiences lend support to this claim. For example, Bagadion and Korten (1991) estimated an annual savings to the Philippines government amounting to US\$12 per hectare from the contributions of the irrigation associations in terms of manhours spent on management, maintenance,

3. Livingston (1993) argues that farmer participation increased the security of water supply through "proportionality rights," by which farmers are allocated a fixed percentage of the water supply, thus eliminating the possibility of no water at all; through prioritization, such that prior rights have a seniority dictating the order in which water is allocated; and through "absence of damage" rules, such that no new users are accepted if augmenting the pool of users affects existing users.

repair, and improvement activities; water distribution and fee collection; and direct cash outlays for canal repairs and supplies and materials. In Nepal, farmers' total contributions represented a 15 percent savings in capital costs (Reidinger and Gautam 1992).

As farmers are organized and trained to take on responsibilities for tasks previously undertaken by agency staff, fewer staff are assigned to field operations, thereby reducing overhead and administration costs. The decrease in cost represents a considerable relief to financially strapped government bureaucracies and enables them to release resources for other uses.

Not only does WUA managements' reduce government capital and recurrent expenses for irrigation, but it has also led to improved rates of fee collection and cost recovery for capital investment. In the Philippines, for example, Wijayaratra and Vermillion (1994) estimated that revenues from irrigation fees accounted for about 60 percent of NIA's total income in 1990, compared to 24 percent in 1979, prior to the transfer program. This suggests that farmers place a high value on irrigation services, and are thus willing to pay for water that meets their needs.

While evidence on the cost savings and increased revenues to government is quite clear, less information is available on the costs of irrigation management, including costs borne by the WUA members. Theoretical arguments point to potential efficiency gains from the reduction in the monitoring necessary (as farmers sharing the same activities have better information about each other), better assessment of the type of service desired locally, and an increased stake in its maintenance. Efficiency gains from local management have been observed through improved supervision of construction and staff, substitution of local materials, and lower salaries or fringe benefits for irrigation staff and labor (box A1-1).

Although total cost reductions are possible, in practice, farmers' costs usually increase with the transfer of irrigation management responsibility to WUAs (box A1-2). Part of the reason is the removal of state subsidies with management transfers. If irrigation service fees were below full O&M costs prior to transfer and WUAs are expected to assume full costs after transfer, farmers' contributions have to increase (unless efficiency gains are great enough to make up for the loss of state subsidies). For example, irrigation fees in Mexico increased fourfold to sixfold when WUAs took over and had to cover full O&M costs. Johnson (1993) shows that expansion in local participation in Indonesian pump schemes resulted in water charges that were five to seven times higher than those imposed by the government, but the new fees still covered only 30 to 50 percent of pumping costs. In one subsystem in the Dominican Republic, fees increased by more than ten times (in nominal terms) between 1986 (pre-turnover) and 1994, but agency subsidies are still required, especially in cases of natural calamities (NESPAC 1994).

Box A1-1. Cases of Total Cost Reductions under WUA Management

In New Zealand, Farley (1994) reports that water charges on privatized systems (averaging 50 farmers, or 2,400 hectares) were two to four times lower than on similar government-managed systems, even though government systems operated at a loss and private systems met full costs. This was because where irrigators owned their own systems, they were able to cut costs by nearly two-thirds because of increased efficiency of operation, lower overhead costs than government systems, reduction in overelaborate engineering design and specifications, and the greater personal responsibility irrigators take for maintaining the systems they themselves own.

In Chile, the state management of a 60,000 hectares irrigated area on Rio Digullin involved five engineers, eight to ten technicians, fifteen to twenty trucks, and five bulldozers, compared to one engineer, two technicians, one secretary, and two trucks under farmer management of the same area. Because farmers work collaboratively with engineers and technicians, they are fully aware of the "true" costs of running the irrigation systems, and for this reason perceive that the water fee charges they pay, even if they are high, are "believable" costs to the association (1993 Annual Memory of the Junta de Vigilancia del Rio Digullin, cited by Gazmuri personal communication 1994).

Box A1-2. Changes in Costs under WUA Management in Senegal

Senegal provides an example of both efficiency gains and cost increases to farmers when WUAs take over O&M. Under agency management, irrigation fees and service quality were both low. The agency provided maintenance and paid for electricity on an irregular basis, leading to highly unreliable irrigation services. Agency field staff were poorly supervised, and would therefore turn on pumps and leave. This resulted in overpumping and system breakdowns. By contrast, WUAs provided more careful supervision of staff, reducing overpumping and thereby cutting electricity costs by up to 50 percent. Other cost savings came from WUAs paying staff less than full civil service rates. Nevertheless, because WUAs had to pay for full electricity consumption along with maintenance and a fund for pump replacement, farmers' fees increased by two to four times Nguyen (personal communication 1994).

In most cases, cash payments do not reflect the full costs to farmers because they do not include labor and in-kind contributions farmers' nonquantified transactions costs of attending meetings, settling disputes, or other aspects of WUA participation.⁴ More careful examination of total costs--including those borne by the state and by farmers, those paid in cash or in kind—is therefore required to assess the overall economic performance impact of WUA involvement. These costs should then be compared to increases in service improvements and resulting income increases for farmers to assess the long-run viability of O&M under WUA management.

Environmental Impact Indicators

Because facilities are regularly maintained and water is efficiently distributed among users, there is less conveyance loss in farmer-managed systems. There is however, a large potential for reducing adverse environmental impacts through farmer involvement. In the Malleco and Bio-Bio provinces of Chile, user associations have been able to force factories (especially the rapidly growing pulp and paper companies in rural areas) to invest in pollution reducing equipment by cutting off their water supply if necessary (Gazmuri, personal communication 1994).⁵ As yet, little documentation is available on the potential impacts of WUA management on waterlogging and salinization rates, but there are indications that in Egypt, replacing pumping by individual farmers from channels and drains with joint pumping by *mesqa*-level WUAs reduces the salinity level of the water applications. Groundwater tables are more difficult for WUAs to control, because monitoring groundwater level and extraction by individuals is more difficult than monitoring visible surface water supplies and use.

PROBLEMS WITH IDENTIFYING PERFORMANCE CHANGES DUE TO WUAS

Although the evidence on improvements in irrigation performance associated with WUAs is suggestive, the fragmentary nature and methodological problems with the available studies make it premature to make sweeping conclusions. Few of the empirical studies give any indicators of performance changes, let alone provide comparable indicators across studies. There is, moreover, a selection bias in the studies, with information on performance changes more readily available from

4. An irrigation project to improve the poor financial situation of the Office du Niger and the living standards of farmers in Mali both increased irrigation service fees and required farmers to contribute labor to maintenance work one day per week. The irrigation service fee alone covered most O&M staff and material costs plus a financial reserve for future work, even without including the value of farmers' substantial labor input (Jaujay 1990).

5. In Chile, any entity holding rights to water must join a users' organization, and under the 1981 Chilean Water Code: "If two or more persons hold the right to use water from the same source (for example, river, dam, channel, or underground water), this creates a de facto association between them, which they may regulate as such by establishing a water community (*comunidad de aguas*), a channel user's association (*asociacion de canalistas*), or any other legal association they may agree on" (Rosegrant and Gazmuri 1994, p. 15).

successful WUAs than from those WUAs that have become defunct. Also, identifying and isolating the benefits accruing exclusively to participation is even more problematic, because the causal linkage between WUA activity and actual gains derived from it is not distinctly separable from other factors, such as better farm management, a sound policy environment, and more favorable market conditions.

Evaluating the impact of management transfers from agencies to farmers is particularly difficult because many cases are too recent to have impact assessments available. In some cases, success measures of performance may depend on the phase of the project cycle being evaluated. In addition, there may be considerable time lags for some projects to generate any discernible benefits. What is often substituted in the literature is comparisons between agency- and farmer-managed systems (for example, Ostrom 1994b). As insightful as these studies may be, it is not clear how applicable they would be to situations where WUAs are developed under agency management and eventually take over the management of the systems.

Because management transfers are often accompanied by physical changes to the system, separating the impact of WUAs from the effects of the system rehabilitation, is particularly difficult on water delivery performance and agricultural output. The lack of good measures of WUA activity makes it especially difficult to identify their impact.⁶ However, to the extent that WUAs contribute to improvements in management or to the sustainability of physical system improvements, isolating the effect of WUAs from overall system changes is unnecessary. What is needed is careful and systematic evaluation of the contribution of WUAs in the overall management transfer process, ideally using a combination of cross-sectional comparisons between systems with and without strong WUAs and time series of the same systems before and after transfer.

Despite the difficulties in evaluating the impact of WUAs, continuing to gather empirical information on how these organizational developments have contributed to improving irrigation system performance is critical. **With the significant investments that donors, governments, and farmers themselves are making in WUA development, we need to monitor their impact so that the organizations serve as more than an end in themselves, but also as a channel to improve irrigation.**

6. In one of the few studies to distinguish between the contribution of a WUA and other activities in a turnover program, Royds Garden, IDSS, and LP3ES (1994) found that the program to assist small irrigation systems significantly improved the adequacy of water supply and yields, resulting in a high rate of return for the project overall. However, when other factors were controlled for, the change in yields was not significantly correlated to the development of WUAs (though in many cases informal WUAs were already strong).

APPENDIX 2. LIST OF WUA CASE STUDY COUNTRIES

Asia

Bangladesh
Bhutan
China
Fiji
Hong Kong
India
Indonesia
Japan
Korea, Republic of
Malaysia
Nepal
New Zealand
Pakistan
Philippines
Sri Lanka
Taiwan
Thailand
Yemen

Americas

Argentina
Chile
Colombia
Dominican Republic
Mexico
Peru
United States

Africa

Cameroon
Egypt
Kenya
Mali
Morocco
Nigeria
Senegal
Sudan
Zimbabwe

Europe

Greece
France
Ireland
Italy
Portugal
Turkey

Part III

**WATER AND SANITATION ASSOCIATIONS:
REVIEW AND BEST PRACTICES**

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1. INTRODUCTION

The World Bank's (1993) Water Resources Management Policy Paper suggests that for sustainable delivery of water and sanitation services, consumers should be provided services they want and are willing to pay for, and that the management of these activities should take place at the lowest appropriate level. Thus, this inquiry into water and sanitation associations is intended as a review of demand-based solutions with suitable institutional arrangements. Currently, various development initiatives taking place, from privatization and decentralizations to increased attention to gender with policy support issues, participation, and poverty alleviation. A common theme is that groups of local users of water and sanitation services could play key roles in service provision.

While nongovernmental organizations (NGOs) and grassroots groups have been working with user groups at the small-scale level for decades, we know little about how to translate their successes into the context of large-scale projects. Furthermore, not all experiences with user groups have been successful. Thus the new focus on local user groups raises a number of questions for example what makes user groups work well? What are the limitations of local management? When should local user groups be supported on a large scale by donor agencies and national governments?

This study reviews experiences with water and sanitation associations (WASAs) around the world, drawing lessons for the World Bank's efforts in this sector. Because the practical experience in this area is new and each country and region is so different, the underlying message of the paper is that fostering WASAs requires learning and adaptation in every case. Rather than presenting static, normative rules for the proper roles and division of labor between WASAs and outside agencies, the paper focuses on the conditions under which WASA involvement in a project works best and on how to foster supportive institutional and policy environments.

Increasing the users of water and sanitation systems control over services will require a fundamental shift from a supply-oriented focus on engineering and construction to a demand-oriented focus on what users want and are willing to pay for, and how best to provide these services. Understanding the internal dynamics of user groups and how external conditions affect their ability to work well is the starting point for efforts to support WASAs. Equally important is understanding what sector agencies must do to support and promote WASAs.

TRENDS IN WATER AND SANITATION SERVICE COVERAGE

With the objective of clean water for all by 1990, in 1980 national governments and donor agencies launched an unprecedented effort to extend clean water and sanitation to everybody. The poor were to benefit from the bulk of new investments. Water sector planners preparing for the International Drinking Water Supply and Sanitation Decade had good reason to be optimistic:

years of applied research and development had yielded many simple, low-cost technologies, and awareness and commitment on the part of governments and donors ran high.

The Good News

Between 1980 and 1990, the percentage of people with access to water and sanitation increased in all regions of the world, for urban and rural residents alike (see table 1-1). The most dramatic improvements occurred in the area of rural water, where coverage increased from 30 to 63 percent. Rural sanitation coverage also increased, but remained low compared to water coverage, increasing from 37 to 49 percent. Urban residents, already better served than their rural counterparts, also benefited from the decade, but in urban areas, population growth outstripped the pace of new investments. In absolute terms, more people were unserved by the end of the decade than at the beginning. Nevertheless, the overall achievements were significant.

Table 1-1. Changes in Coverage, 1980-90

| | 1980 | 1980 | 1990 | 1990 |
|------------------|------------------------------|----------------------------|------------------------------|----------------------------|
| Category | Percentage of people covered | Number unserved (millions) | Percentage of people covered | Number unserved (millions) |
| Urban water | 77 | 213 | 82 | 244 |
| Rural water | 30 | 1,613 | 63 | 989 |
| Urban sanitation | 69 | 292 | 72 | 377 |
| Rural sanitation | 37 | 1,442 | 49 | 1,364 |

Source: United Nations General Assembly, as cited in Evans (1992).

The Bad News

Despite the decade's major accomplishments, most of the new systems fell apart within a few years, many were only partially used, and many peri-urban areas were not served at all. In Africa, as many as 60 percent of the handpumps installed during the decade are no longer working (Ittissa 1991; Morgan 1993; Wood 1994). In urban areas, approximately 50 percent of all treated water is lost through leaky pipes before it ever reaches customers (Ittissa 1991; Yepes 1990). While urban services for the better-off are characterized by high levels of waste and subsidies, most poor urban residents have no access to safe drinking water and must rely on informal sector vendors for highly priced, and often unsafe, water (Bhatia and Falkenmark 1993; Lovei and Whittington 1993; Whittington, Lauria, and Mu 1989). Throughout the developing world sanitation in high-density, poor, urban neighborhoods continues to receive little attention from public utilities. When such utilities build sanitation systems, they typically serve only better-off urban residents, and provide them with equivalent to those in the industrial countries, levels of service often free of charge or at highly subsidized rates (Serageldin 1994).

These findings are somewhat disconcerting, given the resources and energy that went into the decade and the general consensus about the importance of water and sanitation for the poor in terms of health, productivity, poverty alleviation, and environmental benefits. But the problems are not new. Lack of operation and maintenance, unsustainable financing mechanisms, inappropriate services, and poorly functioning water and sanitation agencies have been recurrent problem for decades.

THE EVOLUTION OF SECTOR APPROACHES

During the past twenty years, water and sanitation planners have approached the sectors problems from a number of different directions: the technological approach, the health and hygiene approach, and the demand-oriented approach.

The Quest for Appropriate Technology

Initially water and sanitation experts saw the problem as a lack of appropriate technologies for poor people living in relatively inaccessible areas. This led to the development of numerous handpump options and improved on-site sanitation solutions, but soon even these systems began to break down. New handpump installation was barely keeping pace with the handpumps going out of service (Morgan 1993). Government agencies responsible for maintenance did not do their part, and villagers either could not obtain replacement parts or the repair tasks were too complex for them to perform. Simplified and improved versions were developed (Kjellerup, Jouneys, and Minnatullah 1989), but the question of who was ultimately responsible for them remained a barrier to the provision of sustainable services.

The Health and Hygiene Approach

At the beginning of the decade, the designers of Bank projects started to include health and hygiene education and training in basic repair and accounting to foster (a) heightened understanding of the health impacts of water and sanitation, (b) greater project acceptance and “ownership” by users, (c) better adoption rates of new services by users, and (d) operation and maintenance of new systems by their users. The village-level operation and maintenance (VLOM) concept was intended to bypass unreliable, centrally provided operation and maintenance services by turning these tasks over to the users. In many cases, however, repairs continued to be too complex or too costly and replacement parts too difficult to obtain. Communities rarely developed a sense of ownership as hoped, but continued to expect government agencies to resolve breakdown problems. Unless the improved service was the community's sole option, users readily returned to their original water and sanitation solutions (Morgan 1993). The systems were more appropriate and cheaper, and users were better informed about them, but communities were still not in control of deciding what kind of services they should get and how they should be managed.

The Demand-Oriented Approach

Water demand studies conducted by the World Bank in the 1980s concluded that sustainable provision of water and sanitation service depended on the extent to which consumer's preferences and willingness to pay were incorporated in the investment planning and implementation process (World Bank Water Demand Research Team 1993). Thus solutions to the problems that plagued the sector the lack of adequate operation and maintenance, unsustainable financing arrangements, and the exclusion of large portions of the poor lay in ensuring that users had a say in the types of services they received, and that the latter matched what they were willing to pay for. This new perspective did not reject the earlier emphasis on technological innovation and improved training, but proposed a flexible "doing and learning" method, whereby investments and project planning activities were driven by what users wanted and were willing to pay for.

This demand-oriented approach advocates a shift in the role of water utilities to acting as promoters, rather than just as providers of water and sanitation services with the idea of facilitating users access to services that they want and are willing to pay for. Such a change in orientation can only be brought about only when institutional arrangements are also suitably altered so that service producers have an incentive to respond to consumer demand. These arrangements, which define how services can actually be delivered, have no unique solutions. However, with the increasing experience national governments and donor agencies are gaining in implementing demand-oriented projects during the past ten years, we know much more today about the limits and potential of alternative institutional forms of planning and delivering water and sanitation services. The following are some unresolved questions that remain to be addressed:

- Can one replicate the institutional arrangements of successful WASAs on a large scale within the framework of bureaucratic rules and procedures?
- What types of activities are suited for WASA involvement?

- What roles do governments, utilities, NGOs, the private sector, and local communities play? Are they promoters? Competitors? Both promoters and competitors?

WASAs, as Box 1-2 illustrates, have emerged as one way to develop a demand-oriented approach because their organizational structures can be designed so that they enable users to express their preferences; negotiate both pricing and other community contributions; and provide a platform for users to exercise their "voice" with outside organizations, be they sector agencies, local governments, NGOs, or private firms.

Box 1-1. What are WASAs and Why Look at Them?

Is fostering the formation of WASAs worthwhile? Can they improve the performance of water supply systems? A 1993 survey covering 131 of more than 600 water systems built in Indonesia during the previous 13 years with CARE assistance revealed that more than 85 percent of the systems were continuing to function well. The survey found that most communities had some form of water system management, although not necessarily what the study called a "fully active and functioning village water committee." Most communities had some form of organized joint management, either an authoritarian structure of one or several persons or a more democratic management led by a group of community members. Such groups included formal water committees, mosque committees, or loose groups of affiliated users that included local leaders. Although these forms of management may not fit the strict definition of a formal water committee adopted by CARE, the functional definition of WASAs adopted in this report easily encompasses the organizational structures the researchers encountered. The CARE study goes on to say that the 25 percent of systems where little or no management took place were "often in poor condition with leaking or absent taps, leaking pipelines, and poor drainage." The study concludes that "water committees encourage higher standards, enable greater health impacts, and are a way to enhance sustainability beyond the design life of the water system." In short, although a formal water committee may not be required to keep a water system functioning, some kind of joint management structure clearly improves the performance of water systems.

Source: Hodgkin and Kusumahadi 1993.

SCOPE OF THE PAPER AND DEFINITIONS OF TERMS USED

WASAs are broadly defined here as groups of users who act together to plan or provide sustainable water and sanitation services. For sustainable and adequate services to be delivered, the groups have to devise planning, operations, and maintenance arrangements so that the water and sanitation facilities for which they are responsible provide a consistently adequate level of performance over time. To this end, range of institutional arrangements is appropriate, from informal groups to formal, utility-like organizations. Actions can be carried out jointly through

collective effort or by third parties on behalf of group members. Similarly, decisionmaking can be collective or through representative bodies.

An important distinction is that between *service provision* and *service production*. As described by Ostrom, Schroeder, and Wynne (1993), service provision involves planning and organizing services, whereas service production refers to the actual physical supply of services. For example, a WASA may decide how services should be designed, built, and maintained (service provision), but may hire a private firm to lay water pipes and maintain wells (service production). WASAs may be involved in either or both of these activities.

The terms *joint management* and *WASA service management* used in this paper refer to both these possibilities WASAs do not have to be producing services in order to be engaged in some form of joint management where members of the community exercise control over the planning, construction, and operation of service delivery.

WASAs can develop spontaneously or be developed and assisted by outside entities. While this study focuses on the latter, in many cases successful WASAs build on traditional collective practices or emerge from years of effort by small-scale NGOs and grassroots advocacy work. Usually, large scale efforts to support WASAs treat them as *organizational* structures, but these structures are often underpinned by *institutional* rules (both formal and informal). Many of the informal rule structures are based on norms and conventions that projects cannot influence in the short and medium term, but nonetheless play an important role in making WASAs work well. Opp (1979) describes two conditions under which norms exhibit this type of stability in the medium to long term. First, the norms are internalized become a part of each individual's personality. Second, a sanctions system is in operation, so that conformity to the norms is rewarded and deviations are punished. He describes this feature as *institutionalization*.

When norms are fully internalized and institutionalized to perform specific functions whether it be managing a village handpump, or the local mosque, church, or temple organizational structures are usually visible. While the terms *organization* and *institution* are frequently used interchangeably, this paper follows Uphoff (1993) in his distinction between the two. Institutions are “complexes of norms and behaviors that persist over time by serving collectively valued purposes.” Money is an example of an institution. Organizations are “structures of recognized and accepted roles” with some specific objectives and goals. A water utility is an example of an organization, whose objective is to provide its customers with a safe and affordable water supply. Institutions, such as traditions of reciprocity or mutual aid, can exist without taking an organizational form, or they can develop into informal organizations through mutual agreement or outside influence.

This paper deals with water and sanitation services to the poor residents of peri-urban and rural settlements, as opposed to predominantly agricultural settings, which are discussed in the companion paper *Water Users Associations for Irrigation*. Settlements may use water for agricultural and other productive uses, but the primary need for service management is centered around human consumption and waste disposal.

The paper draws on various literature sources, both theoretical and empirical, as well as information from World Bank projects, United Nations Development Programme (UNDP)-World Bank Water and Sanitation Program field offices, and the experiences of bilateral and nongovernmental development agencies. Much of the literature from various areas is relevant to a discussion of WASAs. Water and sanitation sector literature on community management, community participation, decentralization, and women's participation provides the practical grounding for the issues discussed here. Most of the thinking about the internal user group dynamics of comes not from the water and sanitation sector, but from the irrigation sector and from empirical work on rural cooperatives, where planners have been investigating these issues for much longer. The literature on institutional economics that deals with game theory, transaction costs, free riders, principle-agent problems, and information asymmetries provides useful theoretical tools for untangling many issues concerning internal WASA dynamics, as well as interactions between WASAs and outside agencies. The literature on decentralization and privatization is also relevant to this discussion. This literature re-examines the division between customers and service providers, exploring different service provision arrangements and challenging supply-oriented assumptions that have dominated thinking in the sector.

2. WHAT INTERNAL FEATURES CONTRIBUTE TO WASAS' SUCCESS?

Why should people make the effort to form WASAs? Cooperating and obeying rules are difficult. The incentives to shirk responsibilities are often high. Members will ask: "Why should I help out if I am likely to get the service for free even if I did not help?"

Understanding how water and sanitation associations work internally is fundamental to understanding both when and how they should be supported and when WASA management is not a suitable option. This chapter explores the internal workings of WASAs through a synthesis of the theoretical literature on collective action and empirical case studies. Much of the theoretical work on collective action comes from researchers looking at open access or common property resources, such as forests, grazing lands, fisheries, and waterways (Cornes and Sandler 1986). This literature is relevant to WASAs because many public water and sanitation facilities share the characteristics and problems associated with common property resources that is, the services are usually nonexcludable, in that any local resident acquires a right of access, and unless the community uses rules to regulate this right of access, negative externalities may arise, in the sense that some (or all) users may be deprived of access to the services because some users treat the facilities as open access resources.¹

Another source of insight into collective action comes from institutional economists, with Hirschmann's (1970) pioneering work, *Exit, Voice, and Loyalty*, suggesting methods by which lapses in organizational behavior could be corrected. Writing about game theory both the early works and their recent critiques and modifications help explain how individuals make strategic decisions about their behavior in group settings.

The following sections discuss six factors that influence collective action:

- o Incentives for joint action
- o Rule enforcement mechanisms
- o Group size
- o Origin of group formation
- o Membership characteristics
- o Organizational structure

1. A typical example is public taps vandalized by children, with water flowing unchecked until the community's water tank is emptied and the entire community is deprived of safe drinking water. This becomes a variant of Hardin's "Tragedy of the commons," which describes how open access resources get over-exploited (Hardin 1968). This is a variant of the free rider problems (see Olson 1965).

Before examining these factors, we present an expanded definition of WASAs that some outlines of the conditions that lead to effective WASA action: WASAs are groups of water and sanitation users who share a strongly felt need that cannot be met by individual action, and who have a reasonable expectation that the need will not or cannot be met by an outside party. WASAs are characterized by face-to-face interactions between members that are mediated by a set of economic incentives, with social norms and constraints often used as means of securing cooperation and compliance.

INCENTIVES FOR JOINT ACTION--STRONGLY FELT COMMON NEEDS

Two prerequisites are necessary for communities to form WASAs and collaborate for service provision. First, members of a community must see clear advantages in service management by community-based organizations. Second, the service must have some public good characteristics, that is, it must be difficult for individuals to access the benefit on their own, and once services are provided, difficult to exclude other community members from enjoying them. Jointly managed water and sanitation services become feasible under some institutional contexts and are not feasible in others. For example, people living in arid climates without access to water provided by water utilities often have to cooperate to survive.

For WASAs to work, the benefits of collaboration must outweigh its costs, and high penalties must result for lapses in collective management, that is, to enforce rules must be available. Olson (1965) explained the theoretical basis of the statement. On an empirical level, investigators have obtained verification through case studies of successful collective action (Khan 1992; Watson 1992, 1994), and through comparative studies seeking to explain either the presence or absence of cooperation (Morgan 1993; Ostrom 1990; Rondinelli 1991; Wade 1987).

If a community has access to existing water sources, it may not perceive a new water source as being as vital as other more pressing needs, even if the existing sources are contaminated and inconvenient. The additional costs of a new system may outweigh the convenience and higher quality the new system gives community. Thus forming a WASA is not a sufficient guarantee that the WASA or the services it is set up to provide will be sustainable, unless these services are what consumers want and are willing to pay for. Community members must see the services as a significant improvement, and the perceived costs of obtaining them must not be higher than the benefits they bring. Furthermore, if the community has a reasonable expectation (based on past practices) that public agencies such as water utilities will bail them out in case of an operations or maintenance problem, its members are less likely to work together to make the WASA a credible organization.

In some cases, project design can lower the costs of collaboration, or transactions costs, through ensuring efficient rule enforcement, redefining membership criteria, reducing group size to a manageable number of people, and simplifying organizational tasks and responsibilities. For example, many successful WASAs have delegated tasks that involve high intragroup transactions costs to individuals or groups, for example: The WASA contacts a plumber or electrician is

contracted as the facility operator to do routine operation and maintenance work. A WASA committee that represents the membership and has hiring and firing powers oversees the work of the facility operator. WASA subcommittees handle specific tasks, such as organizing community labor contributions, raising funds, and liaising with public agencies.

As systems become more complex, as incomes rise, and as WASA membership grows, delegating responsibilities becomes more institutionally appropriate. Members may not even be aware of the operator's exact work activities, and be content to make monthly payments on the condition that the operator ensures reliable and adequate services. Clearly, as delegation increases and systems become larger and more complex, WASAs begin to take on the characteristics of water utilities.

Successful joint action often emerges out of experiences of common adversity or a common threat that increase the perceived importance of working together. The saying "we have to hang together, or else we hang separately" has its equivalent in most languages around the world. Joint action under these circumstances is a response to some common adversity. This threat may be repeated natural disasters or hardships such as droughts and damage to water supply sources (Bardhan 1993; Nugent 1993; Ostrom 1990; Wade 1986), the state's failure to meet people's needs (de Janvry and Sadoulet 1993; Nugent 1993), active exclusion from access to services by private or public service providers (Ferreira dos Santos 1981; Attwood and Baviskar 1987; Tendler 1984), or social and political discrimination (Hogrewe, Joyce, and Perez 1993; Jacobi 1989; Solo, Perez, and Joyce 1993; Wells 1981).

Facing common hardships is often a critical factor behind successful cooperation, not only because it creates a strong social glue that makes people help one another out when they ordinarily would not, but also because it generates substantial economic returns to cooperation. For example, in Chile's squatter settlements, groups of women worked together during the military government regime to provide basic services like food and water to residents when the communities were barricaded and under threat of removal by the government and had no formal access to services or distribution channels. Communities in the Sahelian regions of West Africa, where water is a scarce resource, usually have WASAs that function better than communities in the rain-abundant tropical rainforest regions (Savina 1994).

However, unless the crisis or hardship is permanent, collective action often breaks down (Ferreira dos Santos 1981; Tarrow 1983). Once the immediate threat has passed, people go back to their private forms of managing their lives. The lesson for project designers is that it is often easier to mobilize active joint action around activities that are one-time events, such as community contributions toward investment costs that have an obvious and tangible benefit (like building a water holding tank). More routine operations and maintenance activities, such as recovering routine maintenance costs or obtaining funds to repair leaky pipes or blockages in sewerage systems, are less likely to arouse general alarm, and are thus harder to resolve collectively.

BASIS FOR COOPERATION AND COMPLIANCE

WASAs are different from the state and the market in how they go about organizing members and enforcing rules. The state relies on regulations (laws) and adjudication (often just the threat of the police and prison) to get citizens to keep their behavior within acceptable parameters. The market relies on price signals, institutional rules, and an impartial adjudication system so that buyers and sellers can transact with each other and enter into or terminate contracts. WASAs can use both types of mechanisms, but generally rely on less formal approaches for reaching consensus, such as internalized and institutionalized norms and conventions, bargaining, negotiations, and persuasion (Bardhan 1993; de Janvry, Sadoulet, and Thorbecke 1993; Hildebrandt 1994; Jagannathan 1987; Nugent 1993; Rondinelli 1991; Uphoff 1993).

The underlying premise is that community members develop common experiences and social norms over time. These form the basis of what Wade (1987) refers to as “corporate institutions,” which structure joint action, establish rules, allocate benefits, and sanction violators. Corporate institutions are sustained by a process of bargaining and negotiations, whereby the interests of group members are balanced to reach an optimal outcome. Often the critical factor in determining the quality of negotiations is the quality of information available. For example, WASA members need to know the service-level options, including the financial implications of choosing one option rather than to another.

The practical problems confronting national water supply project manager's or World Bank task manager's often have to do with figuring out whether a proposed WASA structure is appropriate within a national and project context, and they should do if WASA structures collapse because internal conflicts preclude any joint action by community groups.

For example, let us consider a water project where a WASA structure is set up, and where one member of the community takes a free ride on others by not paying his monthly water bill, in the belief that he will still get service because others in the community will pay enough to sustain the system. All the other community members follow suit. When the system goes out of service because of a water pump malfunction, the WASA has a hard time raising resources to repair the pump. What are the practical solutions to such situations? Should the WASA deny defaulters access to the water facility? Can it use customary norms and conventions to enforce compliance? Should it simply contract out collection tasks to someone with an incentive to ensure full cost recovery, such as a private tariff collector? Or should the WASA simply be folded up and service provision handed over to a formal water utility?

World Bank-funded projects provide a opportunities for testing many of these ideas, and the World Bank has examined a number of different organizational. However, to date, large projects funded by the World Bank and national governments provide more examples of WASAs that have failed because of the public goods problems than of WASAs that have succeeded.

A pertinent question in this context is whether do common knowledge, assumptions, and values shared by community members increase the likelihood that they will develop collaborative arrangements to manage collective resources like water and sanitation services?

In theory, the answer is yes. Communities that have strong ethnic, religious, social, and cultural ties often work together because they share values about mutual assistance. Shared values contribute to norms of reciprocity, where community members are expected to help each other out and not harm one another. When a member does something that violates these norms, that person is usually punished, either directly through public sanctions or indirectly through internalized shame. In south Indian villages, for example, farmers who take more water than they have been allotted risk a public “dressing-down” by a village-level organization like the *panchayat*, in addition to fines that increase with each infraction (Wade 1987). Thus shame (and conversely status and pride at being a responsible community member), backed up by strong social norms and sanctions, could play a large role in collaborative efforts around service provision.

In practice, however, social norms and conventions may not lead to the desired outcomes. The informal rules usually evolve with respect to specific values and concerns societies wish to address. Communities have no reason to internalize the rules for a new activity such as communal maintenance of a water supply system unless the community as a group perceives strong need to expend time and effort and to police operations and maintenance activities. Unfortunately, in most developing countries the precise opposite has taken place. Governments provide public infrastructure through investment subsidies, and communities perceive public property of this nature as government property, that only a government official can repair.

In addition, many traditional societal norms are built around hierarchical systems in which village chiefs, village elders, or male heads of households are expected to articulate households' preferences. The group's decision making may therefore not reflect the preferences of the actual users of the services, such as women or water vendors, for service levels, for the siting of public standposts, for the extent of physical convenience, and so on. Thus, the presence of hierarchical or (vertical) social norms and conventions does not make WASA formation any easier. In the UNDP-World Bank RUSSAFIYA Water and Sanitation Project in Nigeria, for example, the project designers expected traditional community structures to operate and maintain the water supply infrastructure constructed by the project agencies.

Putnam (1993) argues that social norms and conventions that generate sufficient horizontal networks among community members could make rule enforcement easier. This is because when community members have many forms of social interactions with one another whether through choral societies, soccer clubs, or rotating credit associations the mere presence of dense, horizontal social networks makes the pursuit of a strategy of individual opportunism risky. Putnam, for example, ascribes the rise of civil society in northern Italy, which had dense horizontal networks, to this phenomenon, and contrasts its relative absence in southern Italy, where social networks were more hierarchical or vertical. Evidence from more than a dozen projects that the World Bank is currently implementing could shed some light on this, but the information yielded is still far too preliminary to reach any definitive conclusion.

Another issue is whether transparent rules improve enforcement? The answer is yes, in both theory and practice, provided that WASA members agree with the rule structure.

Simple and transparent rules are easy to understand, and involving WASA members in their finalization is often possible as described in (Box 1-2). For example, WASA rules on community contributions and punishments for defaulters could be worked out through a consultative process within the community. Enforcement ultimately depends on how willing WASA members are to internalize rules as part of their normal behavior. If WASA members fully agree with the project's fundamental design features, such as how service-level choices will be made, how costs will be shared, how water will be distributed, and how sanctions will be enforced, few would deliberately resort to opportunistic behavior. By contrast, if the design features are complex, each WASA member, government official, and project contractor is likely to interpret them differently. Under such circumstances, rule enforcement becomes institutionally difficult because of high transactions costs, and individual opportunism could quickly dissipate any collaborative spirit the WASA is expected to promote.

Box 1-2. The Importance of Implementing Simple Procedures: An Example from Nepal

Under Nepal's Baudha Bahunipati Family Welfare Project, an integrated community development project sponsored by the Family Planning Association of Nepal, fifty-one drinking water facilities were constructed between 1979 and 1991. The project handed over operations and maintenance responsibilities to village-level WASAs, which devised internal procedures for operations and maintenance tasks. A 1994 survey to evaluate how these facilities were performing reported that only one system was completely nonfunctional, although eighteen systems (all gravity-fed with public taps) needed urgent repairs. In most cases WASA organizations were functioning, with many having significant bank balances in their group accounts, but they appeared to lack the initiative to take any action to repair the systems. The survey concluded that in about 66 percent of functioning facilities, WASAs were collecting regular contributions from their members for operations and maintenance activities and depositing these funds into group accounts. The remaining third of WASAs collected money only when they needed funds to maintain the system. In the first group of WASAs, collection of funds did not necessarily guarantee that sufficient funds were available when the need arose unless the WASA met regularly to review and discuss operations and maintenance issues. WASAs that collected regular contributions, but failed to schedule regular meetings around the operations and maintenance agenda, usually ended up being more interested in allocating the collected funds to finance loans to their members for agricultural and consumption purposes.

Source: Wang and Nakarmi (1994).

GROUP SIZE

Group size matters in both an institutional and a technological sense. Collaboration and compliance become difficult as communities get larger and relationships among members become less personal. If group size is reduced, intragroup enforcement of rules becomes less expensive. Reductions in intragroup transactions costs must, however, be evaluated against possible accompanying losses in economies of scale, because water and sanitation technologies exhibit decreasing fixed costs per unit of production. In other words, serving very small communities through several independent systems is likely to incur substantially higher average total costs than serving these feeder systems through a large trunk production and distribution system, which takes advantage of economies of scale. While prescribing an ideal size is successful WASAs appear to have worked out the right tradeoff between raising systems costs and raising transaction costs.

Let us consider three dimensions related to size: reducing WASA group dynamics to a small numbers problem, economies of scale and population density.

Reducing WASA Group Dynamics to a Small Numbers Problem

Reducing WASA group dynamics to a small numbers problem is a way of ensuring face-to-face interactions within communities. Intensive and personal interactions by members is likely to decrease individual opportunism among WASA members (Olson 1965). Size considerations, however, should not be thought of in numeric terms, but rather, in terms of organizational units where group members can maintain personal, face-to-face interactions. In Putnam's (1993) research on northern Italy, for example, the density of horizontal contacts allowed the ideal community size to be considerably larger than what is possible in the vertically-organized communities of southern Italy. Face-to-face interactions enable people to establish relationships of mutual obligation and trust that are part of the consensus and compliance structures discussed above.

In a developing country context, the key could often be something as mundane as providing a meeting place for groups to discuss operational issues. In the city of Ouagadougou, Burkina Faso, for example, regular face-to-face meeting of residents' working groups held in a designated committee room within the neighborhood were the key to successful WASA formation (Ouayoro 1994).

WASAs can thus have a large membership and still be effective as long as the essential ingredient of a mutually agreed upon basis for collaboration is present and all parties have reassurances that others will comply with agreed upon rules. Having face-to-face interactions makes this possible. As shown in the illustration from Bangladesh (Box 2-2), an equally valid option is to use more impersonal institutional rules that generate incentives for people to act in a collaborative manner. The operational challenge is to figure out what those impersonal rules should be in a particular national context.

Economies of Scale

Bulk production, distribution of water supply, and collection and disposal of wastewater exhibit decreasing average costs until a considerable size is reached. Therefore, serving a city of 500,000 people through an integrated production and reticulation system rather than through several small systems making economic sense. Often in rural areas too, there are economic advantages in designing a common trunk system to service a number of feeder systems in each village along its distribution mains.

Innovative technologies and design modification can reduce the optimal size, but constraints to what is technically feasible. In small rural settlements, for example, simplified water systems that rely on earthen berm dams, rain harvesting, handpumps, and protected dug wells are all technically possible, except that their average unit costs of production begin rising rapidly as the service population increases.

Box 2-2. The Rules of the Grameen Bank, Bangladesh

The Grameen Bank, even though it is an organization with more than 1.6 million members, uses rules that provide incentives for face-to-face interaction among members to monitor members effectively and enforce compliance with lending rules. It has maintained an impressive repayment rate of more than 90 percent despite its large scale of operation in one of the world's poorest countries. The bank lends money for productive investments to low-income rural residents, especially women, who have no access to other institutional credit because they are too poor to furnish any collateral.

The bank functions under the following rules:

- Individuals interested in obtaining a loan must first form a group of five members. Each of the five agree to monitor and guarantee the others' loan repayment.
- After a period of orientation and training by bank field staff, two members become eligible to receive loans.
- If these two members regularly pay their weekly loan installments for several months, other group members become eligible for loans.
- If one of the borrowers defaults on loan payments other group members cannot get loans.

The bank's lending policy helps to screen out unreliable borrowers, because others will not want to rely on people they think will not repay their loans. The borrower group arrangement makes use of peer pressure created by the informal relationships and face-to-face interactions among group members to ensure repayment.

Source: Hossain (1988); Khandker, Khalily, and Khan (1994); Quanine (1989).

Implications of Population Density

Settlement density affects both economies of scale and how people interact. In highly dispersed rural settings, physically reaching all members of a community with water and sanitation services can be difficult. The more closely people live together, the higher are the economies of scale achieved by constructing trunk systems. In these situations feeder networks can substantially reduce investment and operations and maintenance costs. In the dense, low-income settlements of Brazil, for example, the per capita investment costs of providing individual house sewer connections were brought down to as little as US \$45 whenever linkages with the trunk networks were feasible in the PROSANEAR project. This was caused both by the benefit of linking with trunk economies of scale, and because WASAs could be formed to operate and maintain condominial sewers within their neighborhoods. The PROSANEAR experience seems to corroborate the premise that people who live close together in adverse conditions (such as inadequate water and sanitation facilities), find it easier to recognize common problems and work together.

ORIGIN OF GROUP FORMATION

While collaborative management structures can emerge spontaneously around the provision of water and sanitation services, some form of outside stimulus and assistance usually precedes most successful WASAs. Where WASAs are being supported as part of a deliberate policy, understanding how outside influences through technical assistance inputs, project rules, and policies interact with the WASAs' complex internal group dynamics is critical.

Establishing the organizational structure of a WASA (choosing office bearers and crafting rules) neither guarantees that community members will recognize it as legitimate nor ensures that it will be sustained over time, unless those members are satisfied that the services meet their perceived needs and match what they are willing to pay.

Findings from empirical studies indicate that establishing new organizational structures with no link to existing demand for the services results in ineffectual, unsustainable management systems. For example, a review of CARE water and sanitation projects in Indonesia, found that only 15 percent of the CARE-assisted villages surveyed maintained active WASA committees. Yet water and sanitation systems functioned well in 85 percent of the villages (Hodgkin and Kusumahadi 1993). Most villages have not followed CARE's organizational rules of WASA structure, but nevertheless manage to maintain their facilities based on some pre-existing community management institution, however informal the communities perceived a need and were willing to pay for the services.

Seeking assistance from existing institutions and organizations can bring WASAs essential management skills for the new task of water and sanitation provision. Communities have often developed workable systems for getting people to contribute resources and follow rules for other tasks that they can then use to manage water and sanitation systems. One way to do this is to seek help from local groups that already have the necessary skills. In Mali Sud areas of West Africa, for

example, informal blacksmith associations can provide the expertise to repair minor problems in the water and sanitation infrastructure (Savina 1994).

A more common method has been to support external change agents, who perform an intermediation role. NGOs and other more formal groups, such as firms specializing in organizational behavior, action research, rapid appraisal, and so on, could perform this intermediation role techniques. The Orangi Pilot Project provides an example of a local NGO that has grown into an institution that is not only capable of perpetuating itself, but of expanding its services and responding to diverse local demands (box 2-3). In several recent Bank-funded projects, NGOs are playing the intermediation role with two objectives. First, they facilitate and encourage informal groups to form WASAs in feeder networks and geographically isolated villages. Second, they facilitate the exchange of information between these WASAs and the more formal water utilities.

Box 2-3. Intermediation Efforts by the Orangi Pilot Project

Orangi is the largest squatter settlement in Karachi, Pakistan. Growing rapidly after its founding in 1965 by 1989, Orangi had about 94,000 households. Despite extensive lobbying efforts, Orangi had not been able to obtain any help from the municipal government for constructing conventional sewers. In 1980, the NGO Orangi Pilot Project (OPP) stepped in to help residents analyze and address their concerns about the health hazards caused by open sewage flowing through the streets. Founded with the help of grant from a private foundation, the OPP set out to identify the barriers to having the residents themselves construct a sewerage system. Using innovative designs and community labor, the OPP was able to bring the cost of building sewerage systems within reach of 70 percent of the settlement's households. Equally important, the OPP helped foster both an attitude of self-reliance (instead of waiting for the government to respond) and the social organization to undertake the collective action.

The OPP model of self-managed, self-financed, and self-maintained sanitation systems has expanded to serve more than 600,000 people living in Orangi. In addition, what began as a local initiative designed to address a specific problem has grown into an institution that serves hundreds of thousands of people in different ways, with programs for improving low-cost housing, upgrading school facilities, providing credit and advice for small family businesses, and furnishing health education and family planning services.

Source: Briscoe and Garn (1994); Khan 1992.

Existing social institutions may or may not be democratic, representative, or even organized in their structure. In the Karnataka rural water and sanitation project, India, village water and sanitation committees have been constituted as elected bodies, but in most communities where the project has been implemented, a few influential people dominate the committees' deliberations.

However, many more community members participate and negotiate service levels through smaller caste-based and gender-based groups. Members of the underprivileged scheduled castes and scheduled tribes and women's groups, for example, prefer reaching internal consensus to discussion in the elite-dominated village water and sanitation committee forum. Although powerful community members exercise social influence through the committees, conflicts on issues affecting group interests, such as the location of standposts, cattle troughs, and trash receptacles, are generally resolved through the smaller, informal groups (Khatri 1994).

The lesson for project designers is to allow WASAs to build on existing social institutions as much as possible, provided that the project maintains a basic demand focus by providing services based on what members want and are willing to pay for (see box 2-4). The link with existing social institutions and organizations could take the form of either overlapping membership between WASAs and existing organizations (as in the Karnataka case), or WASAs formed separately for rival social groups within the same village.

Box 2-4. Honduras: "Piggybacking" on Existing Organizations

Making use of existing community organizations is often an effective way to foster the development of successful WASAs. In Honduras, a study of factors influencing the performance of rural water supply systems found that in communities with successful systems, the water committee responsible for managing the system was either melded into an existing community organization or was able to take advantage of previous organizing experience. The existing organizations included agricultural cooperatives, village councils, and in the case of one very small community, a kinship network. In a community that had an agricultural cooperative, a spillover effect occurred when the water committee took advantage of the cooperative's experience in organizing and undertaking collective tasks. In other communities with successfully functioning water systems, the water committee became part of existing structures which took on the additional responsibility of administering the water systems as part of their ongoing obligations.

Source: Gelting (forthcoming).

MEMBERSHIP CHARACTERISTICS

One issue in connection with group membership characteristics is whether homogeneous communities would be more receptive to WASA organizations than heterogeneous communities?

Most communities are not homogeneous. Thus, if homogeneity were a prerequisite for successful WASAs, their prospects would be dim indeed. Most communities are composed of

better-off and worse-off members, and all communities have both men and women, who generally have a different status within the community. A commonly perceived problem in heterogeneous communities is that of more powerful community members appropriating benefits at the risk of excluding weaker members.

An example of such a problem is the case of the Nyakairu Self-Help Water Project in central Kenya. A local businessman-politician appropriated the management of the water system rather than the water itself, and the results were unsatisfactory for many of the system's members: poor service and a management structure that was not responsive to their concerns. Less than half of the 700 qualified households that made the required contributions of cash and labor actually received water connections. Newly qualified members are being denied connections because of existing members' fears that more connections will exacerbate the water shortage problems. Of the 326 member households who had connections, many never received water because the management of the water committee was completely controlled by the committee chairman. The chairman's son and an employee of the chairman held two other key committee positions, secretary and treasurer. The chairman was a wealthy local businessman and the deputy mayor of the local municipality. While he provided the water committee with office and storage space, he also maintained the accounting records of the water system. Those financial records were so mixed up with the chairman's various business concerns that a UNDP-World Bank study found it impossible to assess the financial performance of the water system. Many of the members of the water system were unhappy with these arrangements and suspected the committee of mismanaging the funds. Water users were also unhappy with the lack of general meetings to discuss problems and hold elections to reconstitute the committee, especially in view of the water system's poor performance (Njonjo 1994). In reality, therefore, the WASA organization was catering to the interests of an affluent minority not because the community was heterogeneous, but because institutional safeguards for sustainable management were lacking.

Most of the literature on WASAs and community management demonstrates that homogeneous communities are easier to mobilize, are better at acting collaboratively, and are more likely to sustain their collaboration over time than heterogeneous communities (Attwood and Baviskar 1987; Ostrom 1990, Tandler 1984; Wells 1981). Communities that are bound together by common cultures, castes, religions, or ethnic makeup have strong social traditions for mutual assistance that facilitate the growth of WASAs. Common group characteristics can even persuade powerful individuals in the group to act in the group's interest even though such action is not in the person's own interest. The prestige of acting in support of the group can outweigh the tendency to act selfishly. For example, rural cooperatives often develop a rhetoric of protecting the "little guy" against "exploitative" private concerns and middle men. Cooperative leaders, although typically the better-off in the community, will bend over backwards to support worse-off members to maintain their legitimacy in the eyes of the community (Tandler 1988).

Box 2-5. Group Heterogeneity and Conflict

Heterogeneity within a group of users such as a WASA may provide an additional challenge to the organization. The village of Khaliqabad in Pakistan is made up largely of two groups: people displaced by the construction of a major dam and immigrants from the Indian portion of Kashmir. After the community had made several attempts to obtain government assistance for building a water supply system, in 1980 the Local Government and Rural Development Department (LGRDD), in conjunction with the United Nations Children's Fund and the community, constructed a system. A water committee was formed with representatives from both groups in the community. By 1984, social and political conflicts between the two groups had reached such a level that the water committee dissolved and management of the system had to be handed back to the LGRDD. After three years of government management, the LRGDD announced that it would close down the project if the community did not once again take up management. Faced with this challenge, the two groups were able to work out their differences and reach a consensus on how to manage the system. In the end, the two groups in Khaliqabad overcame the challenges posed by a heterogenous group of users, but only after facing the ultimatum of losing their water supply.

Source: Ghaffer (1994).

Even in heterogeneous communities, WASAs can succeed if the members share a common perception of risk if cooperation fails. A certain amount of heterogeneity may actually benefit WASA organizations. The key element of cooperation is not so much shared characteristics as a common perception of risk if cooperation fails (Wade 1987), which brings powerful members and weaker members together. Wade (1986) finds that when a few elites who stand to gain considerably by organizing collective action around resource management, they are better equipped to do so than more egalitarian forms of organization. Powerful community members typically the better-off merchants, large landowners, or those with political connections have the managerial skills for organizing collective action, have leverage outside the community to lobby for assistance, and can punish shirkers because of their powerful positions within the community (Wade 1987). Wade notes that the benefits must have public good characteristics for elites to be interested in organizing the services collectively rather than individually.

When local elites have a private stake in the outcome of joint action, they have a strong incentive to initiate joint management because they prefer the cooperative outcome to the option of not having any service at all. For example, in Lusaka, Zambia, a group of affluent vendors of food products run a well-organized, informal market center in the squatter settlement of Chainta. This market serves not only the local community, but also a neighboring middle-class area. The vendors consider access to a reliable and adequate water supply essential for their business and maintain the local water tap through group contributions. Cooperation within a heterogeneous, WASA-like market committee is made possible because the alternative of not having any water would reduce the income earning potential of all the market vendors (World Bank various years, Zambia).

Some jointly managed systems function well because of elites rather than despite them. For example, in northeast Brazil, direct connections to wealthier households often cross-subsidized public tap facilities. The higher level of service for those who could afford to pay for it appeared to prevent the exit of wealthier individuals who might otherwise have opted for private provision. Retaining these wealthier community members within the public water supply system had the effect of capturing their interests in keeping the public taps (as well as their own connections) working. At times, wealthy community members even paid out of their own pockets to keep the systems running (Beteta 1994). If the better-off members decide not to cooperate with the WASA, they deprive the WASA of their management skills, their contacts with government agencies and private sector suppliers, and their powerful voice (Hirschman 1970). Hirschman observes that stronger members are like vocal stockholders; they will make loud noises if the system stops working. If they exit from the collective system and provide for their needs on their own, the organization will have lost a valuable mechanism for repairing lapses in performance.

WASAs typically replicate the community's stratified society: positions of power are likely to be occupied by the wealthier, most influential members of the community. In most societies women are in weaker positions within the community than men. A WASA structure can do little to alter the power relations between men and women, but the platform it provides can increase the bargaining position of less powerful members, including women, by explicitly including them in the process. In Bolivia one project required that women co-sign requests for new projects along with men. This way the men were forced to include women in discussions about the project. Having women sign requests on their own would have been too radical a change, but the co-signing was acceptable, and at least opened a window for wider participation by women (Sara 1994).

Better-off and poorer members of the community do not always have divergent interests. The challenge is to find where the interests of the better-off coincide with those of the poor. How does one prevent the better-off from capturing all the benefits or from exiting from the system, thereby depriving it of their powerful voice (Hirschman 1970) and how does one prevent the exclusion of weaker members?

Successful WASA management depends on the ability to serve the entire community with reliable and appropriate services. Differentiated levels of service within a single system make it more difficult to exclude weaker members while giving stronger members, an incentive to stay in heterogeneous communities. Thus, in water systems with pipe distribution, better-off users could, get full household water connections, while the relatively poor could use public standposts or yard taps. If stronger members of the group can get the high level of service they want, for which they are required to pay a negotiated premium price, they are likely to be the vocal stockholders. Sewerage schemes can also accommodate differentiated levels of service among members. The key to systems with differentiated levels of service lies in the better-off users paying a higher tariff or contributing more when repairs are needed, than to users receiving lower levels of service.

In Indonesia, CARE's Community Self-Financing for Water and Sanitation Facility allows village households that want direct household connections to get them, but they must pay a higher price than households using public facilities. This kind of arrangement also allows for

cross-subsidies that can ensure financial sustainability without excluding low-paying or nonpaying users (Judd 1994).

Transparent rules and ample information reduce the ability of stronger community members to exclude weaker ones in heterogeneous communities. Having clear “rules of the game” that all community members know makes it more difficult for a few to hoard benefits for themselves. When the entire community knows how the system should work, who should benefit, and what each member’s responsibilities are, any deviation from this becomes immediately apparent. Information and transparent rules set the stage for peer pressure to correct opportunistic behavior. Transparency also gives less powerful groups ammunition against stronger members who might hope to exclude them. Weak members can appeal to village councils, neighborhood associations, municipal agencies, or program staff to reverse perceived injustices. Without information and clear rules, weaker members will be uncertain if they have a valid claim, and may not know what recourse they have if they are excluded.

Project design can have a significant impact on both information about the system and clear rules about service access, as described in box 2-6. Merely advocating is rarely enough, for information and transparency. Local elites often maintain their positions precisely by limiting information and by not being transparent. Project design should therefore include explicit plans for disseminating information and crafting rules that protect against exclusion, outside the sphere of local elites.

Box 2-6. Crafting an Inclusion Strategy

In Ouagadougou, Burkina Faso, the designers of an environmental sanitation project were faced the question of how to communicate with the very, poor residents, who traditionally did not participate in community-level meetings. Three factors appeared critical namely:

- Who are the effective interlocutors in the community? Communities were encouraged to elect five or six representatives based on a general assembly.
- How was information to be diffused? Several types of communication techniques were used, ranging from audiovisual and audio to sketches, drawings, and writing competitions.
- How can physical and social distance be decreased between the community and other economic and institutional actors? A committee room was opened in the residential area, and this room became the focal point for all neighborhood-related activities. The room was within easy access, and soon began to function as a popular venue for all residents.

Source: Ouayoro (1994).

ORGANIZATIONAL STRUCTURE

In the same way that WASAs can benefit from the skills and influence of powerful community members, WASAs can also gain by nesting themselves inside existing organized groups that already have a track record of successful organization and community mobilization. Yet structuring the provision of water and sanitation services as one of many tasks performed by an organization as opposed to structuring a single-purpose organization for that function has both advantages disadvantages.

Single-purpose WASAs are more focused and are driven by a specific task. Mastering one task and doing it well is easier when the group's attention is not spread over too many activities (Tendler 1989). By focusing on only one task (water and sanitation), WASAs can tailor their activities to users' specific needs. Groups that are involved in multiple sectors or activities often spread their organizational capacity too thinly, and end up not doing any one task well. Furthermore, by focusing on a single issue like water and sanitation, WASAs represent a single issue interest group, and are therefore able to represent user interests to government and private sector entities, and can lobby for better services or changes. For example, WASAs can press plumbing suppliers to offer users bulk rate deals and can negotiate with government agencies for services that the WASAs are unable to perform, such as major repairs line maintenance of sewerage systems.

WASAs' lobbying power increases when a number of WASAs band together to push for changes (box 2-7). Because of their single focus, when WASAs take on an advocacy role, they are often able to push through policy changes that have a much broader impact than their own day-to-day operational activities in their service areas.

Box 2-7. Association of WASAs in Bolivia

In Bolivia, a nongovernmental association of water utilities from nine districts not only provides needed services to member utilities, but has begun to organize a similar federation among rural WASAs. ANESAPA, which is funded by the utilities and the GTZ, carries out training needs assessments and contracts for training services. It promotes the exchange of expertise among utilities and organizes working groups to address specific themes. ANESAPA has become an important vehicle for representing urban sector interests with the government. Currently, ANESAPA is extending its reach to rural areas through an International Development Association project, where it is supporting the formation of provincial-level associations of WASAs that are twinned with urban utilities.

Source: Sara (1994).

Multipurpose organizations with water and sanitation as one of their many responsibilities also have some advantages. Organizations that already manage joint functions have proved their ability to work with community members and mobilize and manage resources. They have already mastered the tasks that new WASAs may need to learn: bookkeeping, opening a bank account, collecting fees, managing group decisions, organizing repairs, assessing fines, monitoring performance, and interacting with outside agencies. Rather than learning all these skills through a long (and risky) process of trial and error or getting outside training, nesting a WASA within an existing organization can give it a running start, particularly during the critical start-up period. Beginning as a multipurpose organization does not preclude the WASA from breaking off on its own once it begins to mature to take advantage of the benefits of being a single-purpose organization.

SUMMARY

The internal features of WASAs that contribute to their success can be grouped into three sets of factors.

- o The institutional rules and organizational structures need to be conducive to WASA participation by individuals. These may either be informal norms and conventions or more formal procedures and laws.
- o Incentives need to be in place for individuals to take care of their water and sanitation services through WASAs. In other words, the net benefits of providing and producing through WASAs have to be higher than through alternative organizational forms, through such as self-provision, through individual vendors, or through utilities).
- o Group characteristics, such as size, ethnic composition, and the extent of vertical and horizontal social linkages play an important role successful WASAs.

3. UNDER WHAT EXTERNAL CONDITIONS IS WASA MANAGEMENT LIKELY TO SUCCEED?

The preceding chapter examined the internal characteristics and dynamics of WASAs in an attempt to understand the conditions that make joint action among water and sanitation users possible. This section looks at the external conditions within which WASAs function and discusses how these conditions either promote community participation or make cooperation difficult.

External conditions can be more or less unchanging, such as a locality's topography, hydrology, and cultural and historic contexts, or they can be changeable, such as the choice of technology, pricing policies, land tenure laws, and requirements for gaining legal standing as a WASA. Other external conditions that affect WASAs include sectoral initiatives through programs and policies, both present and past. The intent of this chapter is to show how these conditions affect how well WASAs work, and how to design project interventions within these limitations.

The chapter covers the following external conditions:

- o Economic and financial policies that affect the sectoral performance
- o The overall institutional and regulatory environment
- o Hydrological, topographical and demographic factors
- o External support for technology and service-level choices

ECONOMIC AND FINANCIAL POLICIES

Although the sustainability of water and sanitation systems depends largely on their compatibility with local resources, economic and financial policies, which part of the general policy environment, are often critical because they set the incentive structures for individuals to participate in WASAs.

The fiscal constraints facing most developing countries have been facing since the 1980s have forced policy-makers to look more carefully at the efficiency and equity impacts of public investment programs. Despite the decline in overall public investments, a review of public investments in twenty-nine countries indicates that for the water and sanitation sector they have remained at a fairly steady 0.4 percent of gross domestic product. However, the number of consumers demanding water and sanitation services has been increasing rapidly (see box 1-1). A factor that further exacerbated the situation is a distributional one: much of the funding ended up taking the form of subsidies, because the price charged for water averaged only about 35 percent of the costs of supplying it. However, according to Briscoe and Garn (1994, pages 12 and 13): "Although subsidies are justified as being necessary because poor people cannot afford to pay, they end up heavily favoring the rich". Thus most of the poor living in both rural and urban areas thus

end up paying substantially higher proportions of their incomes to informal sector providers of these services. In the Nigerian city of Onitsha, for example, water vendors get ten times the revenues collected by the formal water utility (Whittington, Laura, and Mu 1992).

The severe budgetary crisis and concerns about the maldistribution of public subsidies have stimulated the search for alternative financing and management arrangements to meet the needs of the unserved poor. In a sense, the crisis has also provided an opportunity for institutional innovations and policy readjustments. Whereas earlier high levels of funding stimulated the construction of supply-driven, large-scale urban systems that benefited primarily the better-off, under current financial constraints the focus has shifted to providing services people that want and are willing to pay for, and that can be managed at the lowest appropriate level.

With national funds becoming increasingly difficult to obtain, if facilities degenerate, no automatic funding sources are available for constructing new facilities, as was often the case in the past. Fiscal constraints have thus also increased the attention paid to how recurrent expenditures are managed and operations and maintenance conducted.

The result has been increasing attention to a new agenda that focuses on financing policies and related pricing issues. A direct outcome has been an increased focus on how and what to price in water and sanitation provisioning. In the past many national policies considered water to be a basic right, and governments built new systems with practically no cost recovery from users. Often this carried over into not charging for using the systems as well. By contrast, the new focus, instead, advocates full cost recovery from consumers who receive water and sanitation services from sectoral utilities (such as water and sanitation boards, water companies, or water supply departments). For other unserved consumers, that is, those that previously received services from the informal sector, WASAs provide an organizational platform through which to channel public investments, negotiate pricing decisions, and implement cost recovery (see box 3-1).

In many successful NGO efforts, such as the Orangi (Pakistan) and CARE Indonesia schemes, users bear the full costs of the investments. One of the principal functions of WASAs in these efforts is to negotiate and finalize who pays how much of the costs. Pricing decisions by World Bank-assisted WASAs, by contrast, are largely decided by broader national-level policies in the sector. In countries such as India and Pakistan, these policies require investments in rural water and sanitation to be a 100 percent subsidy from the government. WASAs have only to work out pricing so that routine operations and maintenance expenses are covered. The Uganda Small Towns Project follows a similar model, except that a pricing decision is preempted by requiring the WASA to collect a year's routine operations and maintenance costs up front. In Indonesia's Water and Sanitation for Low-Income Communities Project, investment subsidies are fixed (at about US\$25 per capita), requiring WASAs to raise any incremental funding required to finance higher levels of service. All operations and maintenance pricing decisions remain a WASA responsibility.

Box 3-1. Operations and Maintenance Arrangements in a Zambian Community

In the peri-urban settlement of Kawama West, Mufulira, Zambia, a WASA was formed several years ago with support from Oxfam. For the last five years the WASA has been managing community handpumps through its internally negotiated rules. Each household in the community pays a caretaker 50 kwachas (about US\$0.10) a month, with the clear understanding that he is responsible for maintaining and repairing handpumps and preventing vandalism. It is in the caretaker's interests to ensure that the handpumps are properly maintained, so that he does not incur excessive operations and maintenance costs. The fact that a person is accountable for the facility has completely stopped vandalism by children, and occasionally by drunken adults, a common problem in most peri-urban areas of Zambia.

Source: World Bank (various years, Zambia).

In Sri Lanka, WASAs have to raise about 20 percent of investment costs and recover routine operations and maintenance costs. In Paraguay, WASAs not only have to raise a third of investment costs, but must also take another third as a loan from the water company. In other words, WASAs must work out pricing decisions so that the community meets two-thirds of investment liabilities. In peri-urban areas of Brazil, by contrast, fix the social tariffs charged by water companies, state policies, and WASAs only help to ensure that collections are efficiently conducted. (The information in this paragraph comes from World Bank reports of various years.)

The debate on how to enforce cost recovery from low-income communities is far from settled. What is clear is that project rules should create incentives for service providers to match the services with what customers want, if systems are to be maintained in a sustainable manner. To achieve this objective, institutional rules must provide incentives for consumers to make choices about service levels based on the opportunity costs they face. Water demand studies indicate that poor and hitherto unserved residents in Africa, Asia, and Latin America are willing to contribute to the production and maintenance of services provided that services are reliable and adequately meet their needs for water and sanitation (Briscoe, Castro, Griffin, North and Olsen 1990).

As governments' ability to finance and subsidize public services decreases, the pressure for full self-financing of all water and sanitation services increases. Limited funds will fall hopelessly short of meeting the demand for services unless users pay as they go. In most countries people in high-income, urban areas have never been asked to pay the full cost of water, and particularly of sanitation services, and many point out that imposing full cost recovery from the poor is unfair without well-off users being subject to similar requirements. For this reason, some argue that the goal of full capital cost recovery from the poor should be relaxed as long as those users are willing to make some acceptable form of contribution toward the investment costs. These critics note that one can recover total initial costs by a variety of means, such as indirectly through taxes and other revenue raising mechanisms by the central government or through local revenue raising (Evans 1992).

THE OVERALL INSTITUTIONAL AND REGULATORY ENVIRONMENT

WASAs can function under a wide range of organizational arrangements, ranging from informal village or urban neighborhood associations to formal bodies that may even be part of the local government administration and function much like a utility. While defining the best arrangements in every different context, is impossible one can point to three legal issues WASAs frequently deal with legal standing, land tenure, and easement rights that will have a bearing on where in the informal-formal spectrum these arrangements will fall.

In connection with legal standing, that is, formal registration as a corporate entity the issue is whether a WASAs need a legal standing to carry out some or all of their tasks. If so, can they obtain a legal standing on their own, or do they need assistance to tackle daunting bureaucratic procedures?

In many countries, WASAs must have a legal standing to open bank accounts, take out loans, collect tariffs, contract services, and receive technical assistance from government agencies. In other situations, however, a legal standing can erode a WASA's legitimacy in the eyes of the community and reduce its efficacy. When residents equate formally registered associations with the inefficiencies associated with bureaucracies, having a more informal association may be an asset. For example, in the World Bank-funded Lusaka, Zambia, slum upgradation project implemented in the early 1980s, the project formed WASA-type organizations with the idea that they would operate public standposts constructed in a large squatter settlement. In practice, however, residents viewed the WASAs as a bureaucratic creation because city officials and project planner made key decisions on service levels, siting of facilities, supervision of construction, and so on, without community consultations. As a result, the WASAs never became interlocutors between the slum residents and the civic bureaucracies.

A reverse situation occurs whenever WASAs are assigned pricing and financing responsibilities. For these responsibilities to be actually effected, project planners need to ascertain the merits and drawbacks of legal standing in a specific country, if they consider it necessary, and develop the simplest method to establish legal standing (see box 3-2 below).

Often the key factor appears to be not so much the WASA's legal standing itself, but the WASA's capacity to comprehend how public administration functions. Government agencies or NGOs can help WASAs handle procedural issues in connection with legal and regulatory functions. Such problems have also been common for community-based organizations in industrial countries. For example, after a series of droughts in the mid-1980s, the provincial government of Alberta in western Canada initiated a program to provide rural farmers with drought-proof water supplies. The program sought to tap reliable, but sometimes distant, surface water or groundwater sources for drinking and watering livestock. Many groups of farmers formed water cooperatives to participate in the program. The government provided grants to cover a large portion of the construction costs, with the cooperatives paying the balance of these costs, all operational expenses, and all legal and land acquisition costs associated with developing the new water supplies. Although the monetary costs of arranging legal incorporation and acquiring land easements and water rights were negligible,

Box 3-2. Legalization of WASAs

WASAs are usually in a position to help in taking decisions on the provision and production of services only after they have obtained some form of legal recognition. In Bamako, Mali, for example, informal "lawyer clinics" assist communities to work out their articles of agreement defining the rights and responsibilities of WASAs, and to facilitate discussions with the government and municipalities on the terms and conditions for transferring water supply infrastructure. WASAs also need to demonstrate that they are capable of managing financial transactions by operating a bank account for some time before the transfer arrangements are finalized and municipalities hand over the operations and maintenance responsibilities for water supply facilities in their jurisdictions.

In a Bolivian peri-urban water and sanitation project, a WASA had been in existence for more than a year during the project preparation stage, but became an effective organization only after the Government legalized its existence, permitting it to open bank accounts. Only then did community members recognize the WASA and begin to make financial contributions to the project through it. Legalization also permitted the WASA to participate fully in project implementation, including administering government funds, supervising contractors, and maintaining quality control over materials.

Source: Sara (1994), Savina (1994).

cooperative officials found it difficult to work their way through the bureaucratic maze of procedures and to deal with the numerous regulatory agencies involved. Even though rules and regulations are relatively transparent in Canada compared to those in many developing countries, they still presented a formidable obstacle to the participating farmers. One of the primary roles of the provincial government agency involved in the water supply program was to provide information about and guidance on the various applicable rules and regulations and the processes required to comply with them (Livingstone and McPherson 1993).

The lack of land tenure is a chronic barrier to service in peri-urban areas. At the same time, service provision often serves as a proxy for official grants of land tenure.

In many peri-urban areas, people have often occupied land illegally. The struggles to gain access to water service often go hand-in-hand with the drama of fending off eviction. While in many parts of Latin America and Asia bulldozing and mass eviction policies largely ended after the 1970s, eviction is still a significant concern for urban squatters in many countries, particularly in Africa. Local and state governments, although recognizing that squatter settlements are not a temporary, transitional phenomenon, are reluctant to provide basic services because squatters often use the water bill or the electricity bill as a "proxy" land right on public, or even private, lands. In the latter case, private landowners can legally demand compensation from government agencies that have legitimized occupation by providing permanent services to residents. In some countries, therefore,

proving legal tenure may be a prerequisite for anything but the minimum service provision of a public tap.

Gaining informal easement access is often necessary for providing services in high density urban settings, where informal occupation means that easement rights must be negotiated rather than litigated. Perhaps even more significant is the fact that water and sanitation project planners are rarely accustomed to engaging in informal negotiations about facility siting or network layout. However, planners must discuss both these technical issues with residents when formal landholding and property lines are not legally recognized and high density settlement patterns restrict siting choices. This issue is related to the issue of tenure, but tenure issues involve resolving conflicts between residents and public agencies and private landowners, whereas easement issues involve resolving conflicts among residents.

With water and sewerage networks, easement issues can affect the entire community, and the institutional costs of negotiating with each individual household can make the project impossible for government agencies to manage. In these situations, WASAs have often played a mediation role, negotiating with householders to allow sewer or water lines to pass through their lots or to cede part of their lots for storage tanks. Changing the role of government agencies in the sector is possible only when the institutional and regulatory environment is receptive to change. WASAs function within an institutional and regulatory environment. A critical external determinant of WASA success is whether the institutional environment encourages governmental agencies to switch their roles to being promoters as opposed to being providers. Depending on how the institutional environment shapes in the sector incentives government agencies may provide services directly, particularly in situations where economies of scale, externalities, and natural monopoly conditions are high. Examples of this would be urban wastewater conveyance and treatment or large water catchment, treatment, and distributions systems. Alternatively, the state can take a less direct role and create supportive environments for other actors to take over. In this connection, promotion can take many forms, from national-level enabling legislation to local-level investments in trunk systems and technical assistance that complement WASA activities in feeder networks.

While national-level policies can have an impact on WASA sustainability, experience within the Bank and bilateral donor organizations suggests that the groundwork must first be laid for building national consensus around the new approach and developing the necessary skills and institutional capacity for carrying out demand-driven projects. Whether or not national consensus for working with WASAs exist, they cannot function in an institutional void. WASAs need outside help for their formation, as well as for financing, technology design, access to spare parts, and the more complex operations and maintenance tasks.

Government agencies need to learn how to provide support services or how to facilitate their provision by NGOs, WASAs, or the private sector. Local and regional projects are an opportunity for agencies to discover what arrangements work best given local conditions.

No formulas for promoting and supporting successful WASAs are available. A large part of the task for governments and the donors supporting them is to discover what works well. Can

intermediary support organizations like NGOs and professional associations provide adequate technical and managerial assistance? Is the private sector sufficiently organized to meet the need for spare parts, well drilling, and construction? Can rotating credit funds meet the financing needs or do communities need some grant funding assistance from outside? What is the capacity of local organizations to take on water and sanitation management? The questions are many. Answering them will require a considerable amount of experimentation, with some wrong turns and a great deal of learning along the way (see box 3-3). Only after a number of approaches have been tested and institutional capacity developed can definitive conclusions be reached on the utility of WASAs.

Box 3-3. Building Stakeholder Interest: The PROSANEAR Example

Brazil's National Housing Bank, which was responsible for setting national water and sanitation policies, was disbanded in 1987, leaving a policy void. Before its extinction, however, its staff put together an innovative project with World Bank funding designed to experiment with demand-driven approaches targeted at low-income communities. The project, known by its Portuguese acronym, PROSANEAR, is investing more than US\$100 million to encourage state water companies to explore innovative, low-cost technologies and various community participation approaches. Project investments became possible only when a core group of Brazilian sector professionals and Bank staff saw that their stakes in the project were similar. They shared their experiences in a seminar in December 1994 sponsored by the national executor of the project, Caixa Economica Federal, and the World Bank. The seminar concluded that the experiences are building impressive "case law" for future national policies toward water and sanitation provision in low-income, peri-urban areas using innovative technological and institutional arrangements. Another interesting feature has been the significant learning experience for state water companies in how to interact effectively with previously unserved, informal, neighborhood and resident's associations.

Creating a policy environment that stimulates agency interaction with WASAs can often encourage WASA formation and growth. Basing interventions in the water and sanitation sector on user demand changes the way business is conducted in the sector. Politicians and politically-appointed agency administrators often see the creation of new infrastructure as a means of selectively distributing government largesse and promoting their own careers. Thus demand-driven programs move agency incentive structures away from designing and executing large, engineering, "blueprint" projects. At the same time, the flexibility required in project design also introduces many delays and hiccups actual implementation. Strong support at the national policy level and from the Bank's senior management is a vital prerequisite for implementing a demand-based project.

For example, in 1989 the Tunisian government passed a law mandating the creation of water user associations for the direct management of rural water services. By 1992, the regional staff of the Ministry of Agriculture had established 2,000 new WASAs. However, considerable preparatory work and national-level support preceded their establishment. WASA members were trained and given back-up technical support from the regional offices, which created new units to work

specifically with these groups. The regional offices helped the WASAs discuss options and develop their water sources. The communities were also trained to manage the systems once they were built, including collecting monthly tariffs and maintaining the systems. The basic WASA models had been tested earlier through U.S. Agency for International Development and KfW projects in some parts of the country. This early experience was crucial, because it demonstrated to senior government officials that this kind of program could work well. Once this happened, enlisting these officials to support a large-scale effort was possible (Rosenweig 1994; Rosenweig, Amoun, and Jennings 1992; Rosenweig, Stanburg, and Grimm 1990).

The most important policy changes may be those that increase WASAs' bargaining position in relation to government agencies and private sector providers. Transforming sectoral agencies from infrastructure producers to client-oriented support agencies requires a major cultural change on the part of sectoral bureaucracies and cannot be simply mandated from above. By increasing WASA power in relation to the agencies supporting them, the WASAs themselves may be able to bring about some of this change through their demands. If agencies see WASAs as demanding clients whose needs drive their efforts, they are more likely to structure their services in a way that is relevant for WASAs. The concept of client-centered reorganization is common in the private sector literature on flexible specialization and industrial restructuring, and the implications of a participatory, demand-driven approach are in many ways quite similar (Bhatnagar and Williams 1992; Briscoe and others 1990; Churchill 1987; Paul 1990 a,b; Picciotto 1992; Salmen 1990).

Nevertheless, few empirical studies examine how users' needs actually improve government and private sector service performance, except for a recent study that examined successful statewide programs for health, microenterprises, and agricultural cooperatives in Latin America. The study found that agencies performed best when they were directly responsible to their clients (Amorim 1993; Damiani 1993; Dorado 1993; Freedheim 1993; Tandler 1994). Treating their beneficiaries as clients and working in a problem-solving mode to address their clients' multiple needs transformed previously supply-oriented agencies into effective demand-oriented service providers. A state technical assistance agency worked with associations of small shop owners in their work places to resolve manufacturing bottlenecks and improve their product quality. At the same time, this agency worked as a broker for the associations' products, peddling them to large state agencies that were potential buyers. The technical support agency received a percentage of the sales, which represented more than 25 percent of its operating budget. Because these larger agencies the departments of health, education, and agriculture wanted good products, on time, and at low prices, both the microenterprise support agency and the microenterprise associations had to perform well.

The lessons from this experience for water and sanitation agencies are twofold. First, one of the keys to improving the performance of microenterprise associations (as judged by the marketability of their products) was working directly with producers in their work places to identify the actual problems they confronted. For water and sanitation, providing classroom training on pump maintenance and the like is insufficient. Instead, technical assistance should be provided on-site, where unanticipated problems often occur. Second, the agency supporting the microenterprise associations was itself accountable to its customers. If the larger client's were not happy with the products, the technical support agency was held accountable. In other words, giving

WASAs a greater voice in the execution of publicly-funded technical assistance is suggested - in who should be hired that is, NGOs, private firms, or public agencies; and in the composition of the technical assistance services namely, types of training, types of facilitation activities and so on.

HYDROLOGY, TOPOGRAPHY, DRAINAGE, AND POPULATION DENSITY

Often WASAs' successes may be due to factors entirely exogenous to policymaker. Some examples are discussed in the following paragraphs.

To begin with, the scarcity or abundance of water determines whether people will cooperate to provide services. Hydrological and geological conditions (rainfall patterns, availability of water sources, and depth to aquifers) in conjunction with water demand characteristics (settlement patterns, levels of income and economic activity, and presence of local industries) affect how communities manage water. In areas with abundant and easily accessible water sources, few manufacturing industries, and dispersed populations, the need for organized management is low. Where these conditions are reversed, organized management can become a question of survival. In arid and semi-arid regions, for example, societies have developed traditional patterns of resource management that have been sustained for centuries. In Africa, local villages or nomadic tribes often collectively manage oases.

If water is readily available from unimproved sources, community members are more likely to exit the collective provision system to avoid charges and the costs of complying with collective management rules. Some systems, like simple handpumps and shallow wells, are also easy for better-off members to provide for themselves rather than relying on a communitywide system. However, when water must be conveyed over great distances or pumped up from deep aquifers, it becomes difficult for individuals to access the service on their own. Such situations make collective management essential.

Scarcity of a resource such as water often results in spontaneous emergence of WASAs to mediate conflicts and establish rules governing the use of the scarce resource. In the town of Wobulenzi, Uganda, for example, residents got together and informally organized themselves into a WASA almost two decades ago because of a scarcity of water. They have been operating a piped water system in which the water is pumped from an aquifer to an overhead tank and then distributed by gravity. In the initial years the system's management was in the hands of residents of Asian origin, but after their expulsion from the country, the system continued to operate satisfactorily when managed by residents of African origin. Major repairs, including work on the pump, have been conducted under WASA supervision with no governmental support. All Wobulenzi households benefit from the joint management of their water supply scheme (World Bank staff mission notes). Conditions where individual benefits from collective action are high encourage the emergence of local institutions for joint management (Wade 1987).

Water scarcity patterns (permanent, temporary, seasonal, or daily) also effect how and when groups act jointly. In cases where scarcity patterns vary, the intensity of joint management follows these cycles. When water becomes scarce, the need for regulated use, equitable allocation, and

enforcement mechanisms increases. WASAs may step in temporarily to fill this need and subsequently return to a less regulatory role.

In addition, the nature of the water source determines what technologies are viable and whether outside assistance is needed. As water sources become more distant or deep underground, the system's headworks become more involved. Headworks are the parts of a water system that capture the water, treat it, and convey it to the point of distribution. Headworks usually involve complex equipment such as mechanical pumps and filters and chemical treatment systems that require specialized training to operate, although some systems, such as gravity flow systems, can have technically simple headworks. One of the most significant problems deep tubewell systems in Africa face is the availability of replacement parts and the skills needed to effect repairs (Morgan 1993). As headworks become more sophisticated, the capability to construct them using local expertise and labor is also less likely to be available. Therefore, the more technically complex the system or the more distant the water source, the greater the need for outside assistance, and the greater the need to organize services between feeder services WASAs can manage on their own and trunk systems that water utilities could manage (Briscoe and Garn 1994).

In sanitation systems, settlement density, topography, and soil absorption capacity determine what solutions are possible.

When considering sanitation one must distinguish between on-site and off-site systems. On-site systems are located on residents' property. Household wastes are collected in underground pits that households must empty periodically. Off-site systems carry household wastes off the property through underground pipes to a centralized location for final disposal, often after undergoing treatment to reduce solids and pathogens.

From the point of view of WASAs, the principal distinction between on-site and off-site systems is that individual households operate on-site systems while off-site systems require some form of centralized management of the conveyance, treatment, and disposal components (see box 3-4). Sometimes collective action cannot be organized, and the best approach is to improve individual solutions.

Areas of low population density with sandy soils are ideal for on-site solutions such as simple and improved pit latrines. As density increases and water consumption per household rises, the quantity of effluent generated can exceed the absorption capacity of soils, requiring systems that retain effluent and are periodically emptied or off-site, water-borne solutions. Extremely high density settlements often simply do not have enough space for latrines or septic systems. Topography also influences kind of technologies are possible. In low-lying areas with poor drainage, household wastes tend to pool and stagnate, increasing health risks and creating foul odors. On-site solutions do not work well in these areas because latrines will overflow rapidly. High water tables also interfere with latrine performance, because they limit the leaching of liquids into the soil. Such factors have implications for the design of WASAs. Where the preferred solution is on-site,

Box 3-4. Developing Solutions to Meet Local Needs

In Dar es Salaam, Tanzania, people living in densely settled areas rely primarily on self-dug pit latrines. Informal sector workers remove sludge from the latrines by hand and dispose of it in new holes dug on-site, a time consuming, unhygienic, and expensive method. An off-site sewerage system would probably make more sense, particularly as the residents are running out of disposal areas, but the residents have been unable to work together to build and manage one, and the government cannot afford to provide the service for free. Instead, the Dar es Salaam Sewerage and Sanitation Department has worked with the informal workers to improve their services. A mechanized handpump and vacuum techniques developed and tested cooperatively by the city and the informal sector workers have produced the portable manual pit latrine emptying technology, which takes less time to empty latrines and lowers the cost to residents, thereby making the service accessible to more residents.

Source: Muller and Rijnsburger (1994).

most residents invest private resources in latrines, and the role of a WASA becomes negligible, except for informal overseeing of latrine builders and possible management of public toilets, if any.

When population density is low, on-site solutions are generally more cost-effective than off-site solutions that require expensive trenching, pipes, and treatment facilities. As population density goes above approximately 150 people per hectare, as in dense squatter settlements or areas with multistory buildings, building off-site solutions becomes more cost-effective (Sinnatamby 1990). A number of newer off-site systems significantly reduce the costs of conventional sewerage systems, for example, small bore, simplified, and condominial sewerage. These innovations make off-site systems increasingly cost-effective at lower population densities. When off-site sewers, WASAs have a major role to play, particularly if the solution involves feeder systems of condominial sewers as in Brazil and Orangi, Pakistan.

EXTERNAL SUPPORT FOR TECHNOLOGY AND SERVICE-LEVEL CHOICES

As the previous discussion shows, the types of technologies available are limited by local hydrological, topographical, soil, settlement density, and income characteristics. This section examines the types of external support WASAs may require to operate and maintain water supply infrastructure based on different technologies.

Some technologies lend themselves to autonomous management by WASAs, while others require ongoing support and assistance. Simple, low-cost technologies using local materials and few moving parts are easier for WASAs to build, operate, and maintain themselves. As the systems become more complex in design and require specialized equipment, parts, and expertise, they usually require support from either the government, the private sector, or NGOs.

As noted earlier, water and sanitation systems are often made up of trunk and feeder parts. In general, a system's trunk parts are made up of headworks, street sewage collection lines, and sewage treatment facilities. Feeder parts are branch distribution and collection networks for water and sewage. Feeder parts are relatively easy to manage, while trunk parts generally require specialized equipment and skills. The concepts of trunk and feeder can also apply to the nonphysical aspects of system management. For example, long-term financial management might be a trunk task, while bill distribution and collection might be a feeder task. What is considered trunk and what is feeder will depend on both the task and the WASAs management skills. As a general rule, WASAs require external support and assistance for the following activities:

- o Design, construction, operations, and maintenance of trunk systems
- o Design and construction of feeder systems
- o Technical assistance to operate and maintain feeder systems

Kenya's self help water projects, in which communities attempt to raise resources internally for project investments, provide an example of the range of options for joint provision of services that illustrates how the divisions between trunk and feeder can vary in different settings. WASAs involved in such project's can receive large amounts of financial and technical assistance from the government or private agencies, or they can be largely independent. The Kongoacheke Ngwataniro Self-Help Project, located in central Kenya with sixty-five households, has not sought or received any outside help other than technical assistance and advice. At the outset of the project, the WASA resolved to implement the scheme in phases because of the difficulty of raising the total resources needed to build the gravity flow project. After the intake works were completed, the WASA members decided to raise the membership fee and install smaller diameter, and therefore cheaper, pipes than specified in the design, so as to reach all households in the first round. Since the completion of the original system in 1992, the management committee has gradually begun to replace the small pipes with ones of the recommended size. By such means the Kongoacheke Ngwataniro WASA has managed to complete the water system and provide service to its members without any outside financial or managerial help.

In contrast to the Kongoacheke Ngwataniro scheme, the Self-Help Water Project in Kabuku, also in central Kenya, received considerable financial and technical assistance from SIDA to rehabilitate an older system that had fallen into disrepair. The system pumps water from a river to a storage tank, from which it flows by gravity to 275 household connections and 3 public kiosks that sell water. The outside assistance enabled the community to repair the intake system, replace or repair many of the pipelines, and install household meters.

These two cases from Kenya illustrate the different possibilities for combining community resources and assistance from outside agencies. Both systems function well, provide their members with quality service, and have been able to cover at least their ongoing operations and maintenance costs. They demonstrate also that no one division of labor between communities and government

or other outside agencies will be the best in all settings, but that different mixtures are appropriate in different settings (Njonjo 1994).

WASAs could collaborate in the construction, operations and maintenance of feeder systems and small-scale, simple technologies using locally available materials and technologies. In general, WASA collaboration is essential for supervising construction of all the facilities they are expected to maintain. Simple technologies are easier for WASAs to plan, construct, and procure parts for. In such cases users and WASA members can spot construction errors and intervene to correct them. Small-scale systems are also less likely to attract competition or resistance from large contractors and agency staff accustomed to supply-oriented procurement. Under conditions where the supply of replacement parts is limited and government capacity to support a large number of dispersed systems is also limited, simple technologies have a clear advantage. Simplifying technologies and providing standardized, prefabricated parts for the more complex aspects of a system can bring otherwise inaccessible technologies within reach of users and WASAs. The real test, however, as with any new product, is whether consumers are willing to pay for the services such innovations offer.

By contrast, sophisticated technologies and network systems require outside assistance with construction, supervision, and operation and maintenance. Where conditions call for more sophisticated technologies, such as deep drilled wells or complex water and sewer networks, the technical issues involved in designing, constructing, supervising, and operating the system will generally be beyond the WASAs' capacity. In addition to requiring large-scale contracts and bulk bidding procedures for construction, complex systems require specialized skills, and are less easily managed by joint action. As systems become more complex, either WASAs begin to take on the characteristics of a utility, or they must rely on assistance from outside agencies or support organizations.

Environmental conditions that limit what sources of water are available may force a tradeoff between technology and WASAs' ability of WASAs to become involved in constructing, operating, and maintaining that technology. For example, in many rural areas of Tunisia, environmental conditions severely constrain the technology options available for improving rural water supplies. Dry conditions with only seasonal precipitation make surface sources intermittent and unreliable, while the depth to groundwater (600 to 800 feet) makes handpumps impractical. Deep drilled wells with motorized submersible pumps are the only feasible alternative. This technology limits the possibilities for WASA involvement in construction, supervision, inspection of completed works, and the operation and maintenance of their systems. In a funded by the U.S. Agency for International Development project in Tunisia, WASAs are involved in pump motor maintenance, refueling, and tariff collection, but do not have the technical capacity to remove and or replace submersible pumps from the deep wells (Rosenweig 1994).

When helping WASAs to choose service levels external support agencies must consider the possibility of expansion or upgrades. Users' needs change over time, particularly in rapidly growing urban areas, but also in rural villages. Users that were happy initially with collective standpipes, for example, may later want individual connections. How easy is it to extend services to newcomers

or convert public standposts to individual connections? Can lay workers perform such work without compromising the system's technical performance? Can the system support new individual connections, or will this exceed the design capacity of the water source, sewage treatment system, or conveyance networks? Are decision-making procedures in place to address changing user needs? How will new individual customers be billed?

Expansions and upgrades are much like the initial construction, but have implications for the institutional arrangements. A WASA, for example, may be a suitable organizational form for a medium-size village, but as the village becomes urbanized and industrialized, the system's expansion and upgrading may introduce routines and procedures too complex for a WASA to manage. Two options are then feasible. One is to hand over the management function to the water utility, which previously had a facilitation role. The second is for the expanded system to be subdivided into a trunk system, which the water utility manages, and separate feeder systems that individual WASAs manage.

WASA participation may result in communities rejecting any improvement of their existing systems. At times, only one option may be viable because of local physical conditions, such as in arid areas with deep groundwater. When technology choices are limited, the community may have no more say in project planning other than accepting or rejecting the one alternative. This decision is as valid a form of participation as full design, management, and production of services by WASAs, provided it is based on a commonly agreed evaluation of project costs.

Allowing communities to buy into or opt out of a system expansion is the most obvious way to ensure that communities truly want the new services, and those that do not are not included. This means, however, that the total project costs and number of beneficiaries cannot be accurately estimated during project design. It also means that subproject selection has to be based on selection criteria that are reasonably transparent.

The choice of technology will influence the types of materials and services needed, influence how the procurement process takes place, and affect the WASA's involvement in project planning. There are tradeoffs between greater WASA control over design, construction, and procurement and the greater economies of scale involved in bulk bidding. Procurement is often the point at which well-intentioned, demand-driven projects are converted into supply-driven projects. In general, the smaller-scale and simpler the technologies used, the less advantageous bulk bidding and centralized project management is.

A World Bank-funded water and sanitation project designed to provide demand-driven services to small towns in Uganda ran into problems with construction contracting because of the uncertainties involved in the demand-driven approach. Basic project parameters, such as which communities would participate, what types of systems they would choose to build, and how many connections would be constructed in each system were not as precisely defined as they would have been in a supply-driven project. This uncertainty initially limited the project managers' ability to create bid packages for contractors. The eventual bid packages were not based on entire individual projects, but on project components. For example, well drilling services for all individual project's

are included in a single contract package. Such bulk bidding may not lend itself to WASA involvement in every detail of the procurement process, but may capture economies of scale and result in higher quality finished construction.

The biggest constraint to demand-driven projects is often project planners' lack of familiarity with discussing service levels with WASAs. Engineers and project planners who deal with WASAs need to be particularly sensitive to the members' preferences for service levels. This involves setting aside some common perceptions, such as "the villagers are poor, and therefore should be given only public taps" or "the slum dwellers deserve the cheapest option". In reality, as the World Bank-funded water demand studies of the 1980s demonstrated, user's preferences between service levels are usually clear, and project planners must adhere to them if they are to operationalize a demand-based approach (as illustrated in box 3-5).

Box 3-5. Siting of Water Points Based on Womens' Preferences

Identifying sites for water and sanitation facilities based on technical factors alone may not take into account important information about how people will use those facilities and who will use them. For example, in parts of South Asia, social norms circumscribe women's travel outside the home. In some regions in India, where women traditionally have been the gatherers of water, when public taps were located too far from their homes, women continued to use nearby sources. This practice continued even if these adjacent sources were contaminated because for women to be seen too far from home was considered unacceptable. To avoid these siting problems, community input, especially input from women, as well as technical factors must be integrated into the process of identifying suitable technologies and the sites for deploying them.

Source: Kudat and Weidemann 1991; Simpson-Herbert 1984; Wakeman 1993).

Today, because of the years of experimentation and innovation, many technologies are available that offer a range of service options. The ongoing effort to develop low-cost, simple technologies usually permits offering a community a number of options, and even a range of options within the community, as long as project planners are familiar with them. By involving communities in the planning process, project planners can tailor technology choices and facility siting choices to local conditions, resources, and needs. The issue is not whether making projects demand-driven is a good idea, but how to do it.

A second, and equally important, concern is that project staff themselves are often not familiar with how to make simple modifications to service levels and technologies. Bolivia, for example, has virtually no engineering experience with simplified, condominal, or solids-free sewerage. Engineers in the government's credit agency for urban investments, the National Fund for Regional Development, are uncomfortable appraising and funding these types of projects. Although Bolivia borders on Brazil, which has developed and disseminated for more than ten years, they have not yet been introduced into Bolivia's national and local engineering culture. As a result,

Bolivian engineers prefer designing and building conventional sewerage, whereas these other options could save up to 80 percent of project costs (Sara 1994).

The key to matching demand with service levels and technology is disseminating information and negotiating within the WASA setting. WASAs must be given enough information to be able to weigh the various options and discuss their advantages and disadvantages within the community. During this process communities typically come back to project planners with counter proposals; new demands; or concerns about design, costs, and layout. Listening to these concerns and resolving them before the system is built prevents expensive future modifications or system failure.

In West Java province, Indonesia, agency personnel designed some of the first public taps installed as part of a water supply program without listening to the community. Many systems were rarely used, while others did not provide service to lower-income groups as anticipated. Subsequent modifications to integrate community input led to design modifications that increased the acceptability and impact of the new systems. The modified subprojects in 44 towns, whose population ranged from 3,000 to 22,500, included both public taps and household connections, depending on demand and customers' willingness to pay for higher levels of service. Households with individual connections wanted to maintain a continuous flow into a storage basin continual water flow is considered an essential part of the purity of water used for ritual washing several times a day. To guarantee continuous flow to individual users while still maintaining sufficient pressure in the system for other users, the engineers installed flow restrictors. However, users were unhappy with the flow restrictors and often tampered with them to increase their water flow, thereby causing the rest of the system to lose pressure. After the engineers realized that there was a situation, they returned to discuss the problem with users. After negotiating different options, the community and the project planners developed a new solution: replacing flow restrictors with water meters. Users would no longer be constrained in the amount of water they consumed, but they would be charged more, the more they used. This discouraged excessive use by individual users, ensured enough water for everyone, and addressed the residents' cultural concerns, (Mikkelson, Yulianti, and Barr 1993).

WASAs act as information brokers, acquiring, filtering, translating, and relaying information between community members and outsiders (see box 3-6). Because so little is known about the best way to provide wanted services on a sustainable basis, the need for good information is great for users and agencies alike. Yet for agencies to know what communities want is difficult, and communities have little information about available technologies and how to access them. One of WASAs' principle roles in service provision is to bridge this gap. WASAs are well-positioned to do this because they understand what the community's needs are and can lobby on behalf of the community. They are also able to provide a forum for communicating technology choices and their implications for service levels from project agencies, and to reduce this information to something local residents can understand. It is also easier for agencies, NGOs, and private sector providers to deal with a WASA than to deal individually with each member of the community. WASAs can dramatically reduce outsiders' transaction costs in working with poor communities, while at the same time ensuring that services are appropriate for residents.

Box 3-6. WASAs as Brokers with Utilities: The Sao Paulo Example

In Sao Paulo, Brazil, neighborhood associations took on the role of negotiating with municipal project staff where water and sewerage lines should go to best meet residents' needs. The associations also worked with city staff to persuade some individual residents to reduce their lots or to relocate within the neighborhood to make room for new pipes. The neighborhood associations' work not only made service provision possible, but helped to redefine it to make it compatible with the community members' needs.

Source: Watson (1992).

4. WHAT STEPS ARE NECESSARY FOR SUCCESSFUL WASA-GOVERNMENT RELATIONS?

This chapter draws on the lessons from the preceding two chapters to develop some general guidance for structuring government and donor efforts in support of WASAs. The chapter argues that the role of sector agencies in low-income communities often has to change from one of service provider and infrastructure producer to one of promoter and catalyst. Yet changing how agencies do business is difficult. How to restructure incentives for agencies therefore becomes the first task donors and governments must tackle.

This chapter draws on the literature on public administration reforms as well as on direct sector experience. Because of the newness of the approach outlined here, the analysis is tentative, aimed at guiding careful learning rather than at presenting pat solutions. Five steps are necessary for successful WASA-government interaction, namely:

- o Moving from supply-driven provider to promoter roles
- o Increasing agency responsiveness to WASAs
- o Supporting receptive subgroups within agencies
- o Releasing information bottlenecks: paraprofessionals
- o Defining the roles of intermediary NGOs and the private sector

MOVING FROM SUPPLY-DRIVEN PROVIDER TO DEMAND-DRIVEN PROMOTER ROLES

The water and sanitation sector is largely dominated by an orientation toward increasing coverage, for obvious reasons: large numbers of unserved or poorly served people have a real demand for improved services. Yet this orientation has led to an emphasis on construction, engineering, and capital investments to the detriment of the less immediately tangible concerns of operation and maintenance and of the long-term sustainability of systems.

As a result of this supply orientation, most sector agencies are large, centralized, and overly preoccupied with rigid engineering and construction norms that are inappropriate for all but the better-off urban, middle- and upper-income groups. To move from this point to a sector that produces services that are relevant and that users want requires a major reorientation. Increasing WASA control and management of services plays a large part in this, but does not imply that sector agencies will no longer have any role to play.

The supply orientation has often led to difficulties resisting outside political pressures, as the following illustration reveals. While implementing a World Bank-funded rural water supply and sanitation project, a country's department of public works decided to allocate the well drilling

portion of the project evenly among all thirty-seven provinces in response to political pressures. The department made this decision even though not all of the provinces had completed the provincial priority plan, which was required to proceed with the project in any given province. Provincial politicians, hoping to get as much political mileage out of the project as possible, spread out the project money as evenly and as quickly as they could. As a consequence, sites for individual projects were widely scattered and did not reflect the communities' real demands.

Rather than devising master plans and implementing investment programs based on these plans, sector agencies are now being called upon to play the role of promoter, acting in a catalytic fashion to create enabling environments that support demand-driven approaches to service delivery (Briscoe and de Ferranti 1988; Churchill 1987; UNDP 1990; UNDP-World Bank Water and Sanitation Program 1992). This will require a twofold effort on the part of government agencies and policymakers:

First, promoting WASAs requires sector agencies to become more responsive, accountable, and effective. Working with WASAs requires agencies to interact effectively with users and their representatives. While supporting WASAs may have the ultimate effect of reducing the amount of direct infrastructure production and service provision by agencies, it will also increase the need for agencies to deal with users more intensively than before. The nature of this relationship implies a change from one of service provider and beneficiary to one of partnership.

Second, promoting WASAs requires NGOs and private firms with the appropriate intermediation skills to help sector agencies with the tasks involved. These tasks include such activities as mobilizing communities to establish WASAs; providing managerial, and technical support, implementing training and support for WASA management of financial and cost recovery tasks and managing and supporting private sector services. In many situations the intermediary agency must work as a facilitator, helping groups within WASAs negotiate with each other, resolve conflicts, prevent the tendency for some members to engage in opportunistic behavior that is, take a free ride on the rest of the group and reach a consensus on common institutional goals.

INCREASING AGENCY RESPONSIVENESS TO WASA

Giving WASAs control over the decision of technology, the pace of construction, and much of the management of service provision takes much of the personal and organizational incentives away from sector agencies. Control over these activities, particularly construction, gives agency personnel a great deal of power. The ability to determine where resources are spent, how they are spent, and to whom contracts are let is an essential part of the incentive structure that agency staff operate within. Thus understanding how current incentive structures can be either worked with or changed is important. Removing a large part of the incentive structure for agency staff to carry out their work creates a void that must be replaced with equally strong incentives to perform.

This section discusses two alternative incentive structures for increasing agency responsiveness to WASAs: demand pressure from WASAs and political pressure from politicians and politically appointed agency administrators. Both of these are external incentive structures, as

opposed to internal incentive structures such as salaries, advancement possibilities, prestige, and the like. Most of the literature dealing with agency reforms focuses on the latter without addressing the underlying reasons why sector agencies are nonresponsive, engineering-oriented, overly centralized, and generally supply-driven. Rather, the literature tends to treat sector problems as primarily issues of managerial inefficiency and improper pricing structures and provides solutions in the form of better training, higher salaries, and improved regulations and pricing structures (Bhatia and Falkenmark 1993; Yepes 1990).

While shifting sector agencies from service providers to demand-oriented promoters clearly requires changes in personnel skills and training and increasing managerial efficiency is unquestionably a positive change under any circumstances, these recommendations alone are insufficient, because they do not address the underlying incentives that sustain current structures. By focusing on demand pressures external to agencies, this section attempts to address the larger incentive problems faced in turning nonresponsive agencies into ones capable of promoting and supporting WASAs.

From User Groups to Pressure Groups: Demand-Side Pressure to Perform

In addition to the service provision activities we have discussed WASAs can also play an important advocacy role in meeting the needs of the users they serve by acting as a spokesperson, lobby, or pressure group. In some cases this is a natural part of what groups already do. Urban neighborhood associations tend to develop out of residents' need to have effective representation with local agencies and politicians, and many act more as protest or contestatory bodies than self-help organizations (Bennett 1992; Cardoso 1989; Evers 1983; Jacobi 1989; Miller-Plantenberg and Spessart; Tarrow 1983; Ward 1981). Many neighborhood associations are actually ill-suited to taking on service provision tasks except for short periods as part of an emergency response (Ferreira dos Santos 1981; Watson 1992).

However, acting as an interest group lobby is more than simple demand-making, and protesting. It has an important effect in pressuring public agencies to develop policies and programs that address the needs of those who have traditionally been excluded from service provision. In this sense, taking on a pressure group role, while disruptive and uncomfortable for public agency staff, can be seen as a healthy form of "voice" (Hirschman 1970; Israel 1987; Paul 1990b). Poor customers have little economic and political power, and have less influence than their better-off counterparts, who are able to use political contacts and their own economic importance to attract government infrastructure investments. Higher-income people can also exit from public or collective systems by providing for their needs individually. But the poor, when they act collectively, can often voice their needs loudly enough to attract attention (Salmen 1990).

The strength of poor people's voice can be increased through WASA alliances or federations that lobby for common interests (Bennett 1992; Salmen 1990; Watson 1992). We have already noted the advantages of regional networks in terms of sharing technical expertise, training, and assistance. Strengthening the lobbying power of otherwise marginalized poor customers is another reason why regional networks or federations should be promoted. Federations of WASAs are more

likely to influence policy than individual WASAs acting alone. This kind of demand-side pressure on public agencies takes time to bear fruit, however, and should not be seen as an immediate answer to agency institutional reforms. Rather, it must be seen as part of a larger, long-term strategy involving other forms of external incentives as well as ongoing project-level work, to develop local skills and capacity to work with WASAs.

The Sandwich Strategy: Pressure from Above and Below

When water and sanitation projects are designed to serve the poor, politicians often intervene to direct project benefits toward some areas and not others. Under ideal circumstances, a demand-driven approach would be devoid of political interference and would rely strictly on the demands coming from WASAs. In most cases, however, political priorities do influence infrastructure decisions. Often political decisions are based on party affiliations, voting trends, or where politicians hope to cultivate a loyal constituency.

As communities become better organized and more autonomous from outside political manipulation, political decisions are increasingly influenced by communities' ability to express their interests through their effective use of voice. Politicians who are sensitive to pressures from unserved groups often play a key role in pressing government agencies to begin to implement responsive programs and policies. At the same time, the agencies themselves are also the target of communities' demands. This dual pressure on public agencies from above via politicians and from below via organized communities, has been called a sandwich strategy (Fox 1992ab).

Pressure from organized community groups such as WASAs provides an opportunity for reformist politicians to support policies that agencies and nonreformist politicians would otherwise strongly oppose. Outside agencies, such as donors, can also help open these "windows of opportunity" for reform-minded agency administrators. Lobbying pressure from WASAs alone is often insufficient to bring about significant change. Both sides of the sandwich are needed to generate enough incentive for resistant agencies to begin to change how they work.

Political influence over project site selection is normally seen as a negative influence on projects, and all efforts are made to insulate projects from it. However, a number of empirical studies of successful reforms within public agencies have questioned this view. The authors of these studies argue that the political insulation view ignores the importance of political support in promoting projects for the poor, particularly when they compete with projects that benefit the nonpoor (Fox 1992a; Tandler 1993). Allowing for some political influence in project selection, while taking care to circumscribe this influence so that it remains within acceptable bounds, can harness political support for otherwise unattractive projects.

SUPPORTING RECEPTIVE SUBGROUPS WITHIN AGENCIES

Within large water utilities, a challenge is often to identify and encourage individuals and groups who are interested in specializing in service provision in low-income settlements. The question is how to support these groups, in an organizational environment that does not reward staff

for working with WASAs. Once politicians and agency administrators support working with WASAs, they can create space within larger agencies for these kinds of subgroups and distinct programs to operate. While not a global reform of the agency, such first steps often pave the way for later comprehensive reforms.

For them to function well, receptive subgroups within agencies must have enough autonomy from the rest of the agency to carry out their projects. They need control over tasks such as procurement, project design, and supervision. They also need the flexibility to experiment with different approaches and technologies so as to develop the most effective approach. Experimentation, one key ingredient in innovations, may involve many failures, wrong turns, and mid-course adjustments. Small, autonomous subgroups are well suited for this kind of task, because the consequences of the early learning missteps are not catastrophic, and are easily reversed, provided local residents are adequately represented. Once the subgroups have developed workable technologies and approaches, can be introduced to the larger agency (see box 4-1). During the initial stages, prestige imparted by senior agency administrators or donors outside the agency provides the crucial institutional space and support to allow innovations to develop.

Box 4-1. Supporting WASA Promoters within Water and Sanitation Organizations

In a flood-prone area of Kampala, Uganda, a project unit funded by the International Labor Organization was created to develop a new approach: working collaboratively with residents in a poor urban neighborhood to develop low-cost drainage infrastructure. Residents were organized by block, and project staff engaged in intensive negotiations with block residents to determine the best network layout for each block and establish operations and maintenance arrangements for the secondary and tertiary networks. The Kampala City Council staff supported the new project unit's approach because they saw it as a way to respond to long-standing demands from residents. Thus the subgroup was given full control over procurement, project pace, and design and received special attention and status within the council. This prestige fostered a climate of commitment and a sense of mission within the project unit, and provided an environment in which the team could experiment, learn, and perfect its project implementation approach.

Source: Jagannathan and Wall Bake (1994).

This intensive learning phase is necessary before the larger agency can streamline and adopt new project approaches. The role of receptive subgroups is similar to that of an incubator, in which new approaches are nurtured, developed, and elaborated until they are sufficiently well formed to be hatched into the less hospitable environment of the traditionally-oriented agency.

RELEASING INFORMATION BOTTLENECKS: PARAPROFESSIONALS

Unlike rural extension agencies, which have developed large staffs of field-based workers with skills tailored to the multiple needs of rural producers, the skills of utility and sector agency staff tend to be limited to engineering design, construction supervision, tariff collection, and internal management tasks. To take on promotion roles, sector agencies will need to have a cadre of workers that function like extension agents, working on-site to solve the multiple problems WASAs face. Such functions are best accomplished by lower-level technical or paraprofessional staff who can provide support for the new tasks the WASAs will be taking on: learning about and evaluating technical options, making collective decisions, resolving conflict, managing groups, administering finances, carrying out operation and maintenance work, procuring replacement parts, and so on. The agency can either use its existing staff or hire NGOs or private firms with proven track records.

In Paraguay, a large cadre of paraprofessional field staff supporting local WASAs has allowed service to be extended to areas the national sanitation agency had never reached before. Sanitation inspectors, who are social workers with practical training in water and sanitation, are stationed in local health centers, where they are readily accessible to WASA members. Although they are not well paid and many do not have a college education, WASAs members find their help indispensable, which allows the inspectors to acquire status and prestige. The inspectors provide timely, useful information and assistance. Because they can quickly go to see the problem pump or leaking pipe section, they can identify the problem and solve it immediately. As they are located close to the water systems they have regular contact with WASA members, can learn what kinds of services WASAs need, and can adapt their work to address the needs identified (Chang 1994; World Bank various years [Paraguay]).

In many other Latin American countries the same paraprofessional agency personnel can provide most, if not all, of the needed technical and managerial support to WASAs, from WASA formation, to project design, to construction, to operation and maintenance. In other cases projects have used multidisciplinary teams composed of a few sanitation professionals and a larger number of paraprofessional or lay staff who are trained in community mobilization, management, and technical skills. In still other countries, such as India, Indonesia, Sri Lanka, and Uganda, in Bank-assisted projects NGOs and private consulting firms specializing in these types of outreach activities are helping to establish WASAs and design and build their new systems.

Paraprofessionals and lower-level agency staff are better at interacting with WASA members than highly trained engineers, sociologists, and social workers. While professional training is necessary for some tasks, the most difficult part of working with WASAs involves effective listening, communication, negotiation, and conflict resolution. Paraprofessionals can learn other tasks, such as assisting with system design and construction and providing management and financial training, health and hygiene education, technical training, and technical support for operation and maintenance tasks, or others can be hired to perform them as needed.

Effective communication requires agency staff to have the incentive to take this responsibility seriously: to understand the needs of WASAs and the concerns that drive their

decisionmaking. The goal of demand-driven projects is to develop services and service delivery approaches that match what people want and are willing to pay for. Market research, contingent valuation studies, or other instruments aid this process, but many will not reveal community concerns, beliefs, traditions, and constraints. For this dedicated staff responsible for intermediation are called for (see box 4-2).

Box 4-2. Intermediation Work for WASA Development: Brazil's Experience

In Brazil, the innovative, low-cost, condominial sewerage system relies heavily on low-level technical staff who are trained in the system's technical aspects, and who develop community mobilization skills through on-the-job experience. Most have no college education: some come from vocational schools, others are students in social worker programs. Often they grew up in the same neighborhoods where they are now working.

This cadre of paraprofessionals works intensively with residents explaining the technical aspects of the system, the different levels of service residents can have, what each costs, and what residents will have to contribute to get each option. The staff listens carefully to residents' questions, holding repeated meetings with residents on each block if necessary. They then translate these concerns into practical solutions, negotiating them with residents. If they encounter an impasse, they present the problem to their supervisor, who is usually an engineer. Most of the time they are able to work out problems directly with the residents within the bounds of established program rules. They have sufficient knowledge, confidence, and discretion to solve all but the most difficult conflicts they encounter.

Not only are these paraprofessionals effective at communicating with residents they speak the same language and are more likely to take residents' concerns seriously than highly trained outsiders but they cost much less than their professional counterparts. This is important, because their tasks involve lengthy and repeated meetings and careful negotiations to ensure that all concerns are addressed and everyone agrees with the final decision.

Source: Watson (1994).

Having an effective bridge between agency professional staff and communities is a fundamental aspect of developing a demand-oriented service approach.

DEFINING THE ROLES OF INTERMEDIARY NGOS AND THE PRIVATE SECTOR

So far we have discussed primarily the relationship between sector agencies and WASAs. In practice, many other institutional alternatives are available both for assisting WASAs and mediating the relationship between WASAs and sector agencies. Intermediary NGOs and the private sector can both play these roles, depending on WASAs' needs and the sophistication of these entities

in the country concerned. Both have an advantage over staff in government agencies in that their incentive structures can often be tailored more easily to match the requirements of the user groups or beneficiaries. Before discussing what kind of roles they can play, let us review some distinctions between the various forms of outside entities.

Private sector entities are for-profit private firms that provide everything from well drilling to equipment repair, spare parts, and technical services such as cleaning out pit latrines and providing facilitation support for WASAs. They may be large firms, but in many cases are conglomerates of small, local firms that deal with individual WASAs.

Intermediary NGOs are support organizations that work with communities to provide services or help organize the provision of services. Unlike private sector providers of goods and services, these NGOs are known for their commitment to organizing the poor in water or in related sectors, such as health, education, and income generation. They work to build capacity, providing training in management, finances, bookkeeping, and group decisionmaking skills. They also provide links to resources outside the immediate community, such as government programs, credit institutions, and international donors. The Inter-American Foundation supported a study of intermediary NGOs that provides a useful categorization of these entities. The following descriptions are adapted from Carroll (1992).

- Primary grassroots organizations: an aggregation of individuals or households involved in joint activities, for example, WASAs, irrigation water users associations, a single cooperative, a single microenterprise association.
- Grassroots support organizations: local or indigenous advocacy and service organizations serving primary grassroots organizations that may also work to forge links between beneficiaries and government, financial institutions, and donors, for example, the Grameen Bank (also see box 4-3).
- Membership support organizations: local service and advocacy organizations whose leaders are formally accountable to their membership, which is composed of primary grassroots organizations, for example, federations of water users groups, agricultural cooperatives, unions.
- International NGOs: organizations working in-country, but with outside funding and expertise, for example, CARE, Save the Children, Technoserve, Accion International.

In large Bank-assisted projects, the lines between NGOs and private firms often become blurred once they are hired through the project procurement procedures. The type of entity used will depend on the particular region or country. Large countries like Brazil and India will have management consulting firms as well as a large pool of NGOs to choose from, whereas in many countries of Sub-Saharan Africa and Asia, expatriate NGOs and consulting firms often provide these services. In general, Bank experience has shown that using NGOs in Bank-sponsored projects works best when the projects build on what NGOs are already doing (Salmen and Eaves 1989).

A key factor whether working with private firms or NGOs appears to be the availability of organizational capacity to perform tasks on a larger scale than had previously. Dedicated groups may work exceedingly well on a small scale, during which the focus of their attention and expertise is concentrated on a few users. Once the scale begins to increase, management and organizational complexities begin diluting the group's effectiveness. Much of the literature that argues for increased private and nongovernmental roles in the sector ignores this crucial limitation, while advocating more delegation of responsibilities simply because of the limitations of traditional sector agencies. Rather, their contribution lies in a redefining services based on their intimate understanding of users' needs.

Box 4-3. The NGO experience in Kenya

In Kenya, one service-oriented grassroots support organization used its contacts with both the government and community members to help bring the parties together, forging a relationship that was mutually beneficial. In Kibera, the largest informal settlement in Nairobi, the local government has been reluctant to provide such services as water and sewerage. Because of the lack of formal public services, a number of NGOs have become involved in the area, among them Kenya Water for Health (KWAHO). One of the most important of KWAHO's activities has been to assist local groups in their interactions with the local government and donor agencies. KWAHO was able to help fourteen women's groups in Kibera who had organized themselves to build new public water kiosks. KWAHO persuaded the Nairobi City Commission to connect these kiosks to city water mains.

KWAHO also helped the community get funds from the Norwegian Aid Agency for a latrine-emptying vehicle. Pit latrines are the primary form of sanitation in Kibera but because of the high water table (which limits leaching into the soil) and the heavy use of the latrines they fill up quickly and must be emptied often. KWAHO again acted as an intermediary between the community and the City Commission to get permission to discharge latrine sludge into city sewers outside the neighborhood.

This interaction was not just a one-way street. The successful use of the latrine-emptying vehicle in Kibera led to interest within the City Commission in obtaining similar vehicles for use elsewhere. Prior to this interaction with KWAHO and community groups in Kibera, the City Commission was not aware of this alternative technology.

Source: Kunguru and Mwiraria (1991).

The most difficult issues often center around the procedures for and processes of dealing with bureaucracies. Complying with governmental procedures, securing contract payments on time, coordinating with construction contractors, carrying out other related programs, and so on are often entirely new experiences for these organizations, which often require a reorientation of their working styles (see box 4-4). However, the new genre of Bank-funded water and sanitation projects that encourages WASA participation in service provision provides substantial funds for this

intermediation role ranging from 5 to 20 percent of investment outlays but the actual role of this form of intermediation by NGOs and private firms is still to be evaluated.

Box 4-4. Models of Institutional Intermediation in Bank Projects

Ongoing, World Bank-aided water and sanitation projects are currently testing several variants of intermediation using NGOs and private firms to assist WASA capacity building:

- In the Ghana Rural Water and Sanitation Project, NGOs and private consultants are helping village communities to form WASAs and present their proposals before the district assemblies for approval.
- In the Uganda Small Towns Project, local NGOs and private consultants help communities mobilize themselves into WASAs under supervision by an international consulting firm.
- In the Nepal Rural Water and Sanitation Project, NGOs assist not only in forming WASAs, but in finalizing project proposals.
- In the Karnataka (India) Rural Water and Sanitation Project, a private management consultant firm helps the project secretariat oversee facilitation by district-level NGOs.
- In Indonesia, large national and international NGOs and engineering consulting firms have been contracted as project advisors to each of the six provincial project secretariats. Smaller local NGOs and private firms carry out the actual work in the 1,440 project villages.
- In the Brazil PROSANEAR project, private firms and NGOs have formed consortiums to assist project managers design schemes with WASA participation

Source: World Bank (various years, Brazil, Ghana, India, Indonesia, Nepal, Uganda).

Two steps can help protect planners from excessive optimism where intermediary organizations and the private sector is concerned: first, a realistic assessment of actual activities carried out by these two groups in a country context and second, the institution of policies that support the development of such groups. Information about what NGOs and private firms are doing in the sector should form the basis of any program that involves turning over government tasks to them. Unless proven capacity exists, such programs are likely to result in service deterioration, not improvement. Also, a survey of current NGO and private sector activities may reveal many activities that sector agencies had never thought of as necessary, but that are crucial for meeting users' needs. Discovering and addressing unmet needs is a classic comparative advantage of NGOs. Surveying NGO activities allows sector planners to take advantage of this.

Policies that support NGOs and private sector firms, particularly the new groups of private consultants, are a prerequisite for creating a resource pool upon which the government can draw. The exact mechanisms for doing this are still being tested, but a gradual, balanced approach could be one of encouraging WASAs and WASA federations to exercise voice in the choice of whom to contract and the tasks to be contracted from among NGOs, private firms, government agencies, or even their own members.

5. CONCLUSION: LESSONS FOR JOINT MANAGEMENT

A number of lessons emerge from the preceding chapters. The first is that working effectively with WASAs represents a substantially different way of doing business for the sector, and the role of sector agencies must be reconfigured accordingly. Rather than focusing on construction, sector agencies must become facilitators and organizers, only taking on service provision tasks for which they have decided comparative advantage. In serving the poor, most of the difficult work will involve not engineering design (at least, not traditional large-scale engineering design), but intensive interaction and problem solving with groups of users who are given increasing control over planning and managing their own services. This is no minor task. It will require creating a set of rules that enables the formation of WASAs without much difficulty, and more important developing procedures by which WASA members can take key investment and operational decisions and interact with facilitating water utilities.

The second lesson that while devising the right type of WASA is specific to a particular country context, there are a few common roles WASAs can perform in helping in sectoral decisionmaking.

- A platform to discuss and negotiate individual preferences for services and to match the collective demand with the appropriate service-level option
- A mechanism to work out financial contributions by members and pricing and cost recovery arrangements
- A body with sufficient collective voice to interact with water utility organizations
- An oversight agency for training, operations, and maintenance.

The third lesson is that the most appropriate role for water and sanitation associations cannot be prescribed in advance. It has to evolve in a country context, depending on local policies, conditions, and institutions. A wide range of possible roles for WASAs exists, from acting only as a pressure group for accessing services or improving public agency accountability, to full control over design, construction, pricing, and management and operation of water and sanitation services. Regardless of the extent of autonomous WASA management, the government will have an ongoing role and intermediary NGOs and small private firms will have an expanded role. The task is not to discover how many responsibilities can be devolved to WASAs, but how to meet users' needs most effectively. WASAs can play an important part in this in collaboration with these other actors.

The policy implications of the review of WASA experiences for donors wishing to work constructively with WASAs concern three sets of issues, namely:

- o Economic and financial issues

- o Technology issues

- o Institutional issues

The following paragraphs discuss these issues in turn. In each case, general policy guidance is presented based on the design principles derived from the theoretical and empirical body of literature reviewed.

ECONOMIC AND FINANCIAL ISSUES

Getting the incentives right requires paying attention to the opportunity costs of service provision to both service providers and users of services. Initial and recurrent cost recovery arrangements are at the heart of sending clear signals to residents about their technology options and the costs associated with them. The key is not necessarily to recover all costs, but to ensure that people's interest in the project is reflected in their choices. The most direct way to gauge interest is by ensuring that prices reflect the true opportunity costs for gaining access to the services. The pricing decisions are, however, often modified by other financing rules, such as up-front cash contributions toward investment financing and contributions of labor and materials. WASAs' role in this process can be critical ranging from maintaining a bank account for cash contributions and tariff collection, to organizing work brigades, to enforcing the requirement that all members honor their commitments. While in many countries full investment cost recovery from the poor is often not insisted upon by policy makers on equity grounds, recurrent cost recovery has become necessary for all water and sanitation projects.

Redirecting funding toward WASAs may slow disbursements, but improve sector performance. The unfortunate outcome of large construction projects that ended up subsidizing better-off populations can be reversed by well-organized WASAs. This shifts the project focus to smaller-scale projects that are often jointly funded by WASA-mobilized resources. The risk is that WASA processes tend to be slow at first with meetings often being bogged down by conflicts within the associations. In the short run, disbursements slow down as experience with Brazil's PROSANEAR and Indonesia's Water and Sanitation Low-Income Communities projects attest but in the long run, the projects reflect what users want and are willing to pay for, thereby leading to sustainable outcomes. This issue becomes significant, because a blue-print-driven water supply project can quickly disburse substantial amounts in the advance purchases of pipes and other heavy equipment. If a task manager's performance is evaluated on the basis of disbursement speed, WASA promotion is unlikely to find much support.

Cost recovery and pricing policies need to be consistent, including those emanating from social investment funds. In many countries a significant equity issue arises. Having some users (in a WASA-supported project) face requirements for full cost recovery while others (in another project or national program) receive services for free under the auspices of poverty alleviation programs channeled through different types of social investment funds undermines the basis for demand-driven approaches.

The Bank is encountering this problem in several projects where communities receive confusing messages because the two approaches are fundamentally different. Agencies and users must both face consistent and transparent rules governing pricing and cost recovery before they begin to interact as demanding customers and responsive agencies. For this to be resolved conflicting rules between sectoral programs that are and other social programs also investing in water need to be addressed before project appraisal, particularly on issues relating to pricing and cost recovery from beneficiaries.

TECHNOLOGY ISSUES

Simple low-cost or feeder systems lend themselves to autonomous WASA management, while more complex trunk systems are more suitable for management by water utilities. Presenting small-scale, low-cost, and simple technical options is not always possible, but whenever the opportunity arises, centralized project management, bulk bidding, and large contractors, which often provide perverse incentives that promote rent seeking and corruption, and should be eliminated. Simple technologies are easier for WASAs to monitor and regulate during construction and operation because errors and infractions are easy to observe. In some cases, however, simple, small-scale technologies are not possible or not desirable. In these cases, the WASAs could continue to play a role in managing systems in feeder networks, such as within a slum or favela. In general, while the management role will be reduced, there is still much scope for WASAs to act as regulators by monitoring public and private sector performance.

There is considerable scope for expanding the menu of low-cost, simple technologies and for disseminating those that succeed in one part of the world to another (Asia to Africa, peri-urban Latin America to peri-urban Asia, and so on). Dissemination should focus not only on the technologies, but also on the management structures and institutional considerations implicit in different technology choices. Professional organizations and exchanges across countries should be the focus of the dissemination process, so that sector practitioners in each country have access to this information.

Information, negotiation, and flexibility are key to matching technology with users' needs, customs, and financial resources. Because little is known about the preferences and service needs of the poor in rural and urban areas, agencies must adopt a learning approach in which inputs from residents during project negotiations result in design adjustments, so that the service ultimately matches what residents value. This process necessarily involves some wrong turns, conflict, and experimentation before the best solutions are found. Over time, however, agencies will learn more about what the poor value, and will become better at facilitating negotiations with previously unserved groups. Helping people manage their own services may ultimately result in less government involvement, but while governments and donors are still learning how to do this well, more intensive interaction between governments and users and donors and borrowers will be called for.

INSTITUTIONAL ISSUES

Building constituencies and making agencies responsive to them is often a critical element of institutional design. Agency institutional arrangements vary widely from country to country and over time. The key to success is to make agency behavior demand-driven. Part of this involves establishing clear rules that guide agency interventions and make project implementation and system management arrangements transparent, with clear criteria for access to project benefits and clear delineations of responsibility between WASAs and government. More important, however, is creating institutional incentive structures that lead agency staff to work effectively in collaboration with WASAs. Incentives are created by identifying and cultivating constituencies for the new policy direction, and allowing their influences to guide agency action.

In some settings WASAs themselves represent a powerful constituency, able to press their interests directly with agencies and other organizations involved in service provision. In other settings, constituencies outside the community must be cultivated to bring additional demand pressure to bear on agencies. These constituencies can range from local-state-and national-level politicians and administrators, to outside advocacy groups, to "competing" agencies that have an interest in the agency's performance. For example, the ministry of finance may be a powerful constituent in reducing sector expenditures, and therefore will support projects that involve more cost recovery. While such agencies' interest is limited to the financial aspects of service delivery, their support of demand-driven projects may play a key role in the projects' success. The point is to develop incentive structures within agencies that can override supply orientation. Part of this rests with WASAs, which are the foundation upon which the approach depends.

The benefits of collective action must outweigh its costs, and lapses in joint management must incur high opportunity costs if WASAs are to be sustainable organizations.

For WASAs to provide water and sanitation services in a sustainable manner, they must be perceived as a vital need, with clear opportunity costs when services are disrupted. Clearly, joint management has to be a better institutional option than management by the private sector or by the water utility if communities are expected to expend energy organizing themselves.

A number of factors can reduce the costs of joint management, like homogeneous social structures, pre-existing organizational capacity, traditions of mutual assistance, and the predominance of face-to-face interactions among community members. Delegating responsibilities to a representative body and hired technicians can also reduce the transaction costs of joint management. Building on existing social institutions, learning from other WASAs, and getting assistance from intermediary NGOs also facilitate WASA formation and sustainability. Project planners need design interventions based on a careful survey of demand, of how communities currently organize joint efforts, and of what NGO and private sector resources are available to support WASAs. As the benefits and costs of collective action could change with time and economic development, WASAs need to be viewed as evolving bodies that may or may not be as relevant in a community five years from now as they are today.

WASAs and paraprofessionals can improve information flows and reduce transactions costs. WASAs often function as information brokers, synthesizing information in understandable ways for group members and advocating the group's position with agencies. WASAs articulate the interests of group members and facilitate negotiations with agencies. Paraprofessionals working within agencies can also improve interactions between agencies and users because they are often better at listening to WASAs' concerns and developing solutions tailored to their needs than professional engineers are. Developing a cadre of competent paraprofessionals whether within the bureaucracy or outside will require shifts in hiring and training practices within sector agencies. WASAs can increase their ability to negotiate effectively with agencies by forming autonomous federations of WASAs. Through such federations, WASA leadership will not only learn about successful organizational strategies in other communities, but will be able to press the government on common concerns more effectively.

Clear information about rules for service access can reduce the exclusion of weaker groups and group members. Transparent rules of the games make it more difficult for local elites to exclude weak group members from services, and also make it more difficult for politicians to use water and sanitation projects for purely political ends. Access to information increases WASAs' bargaining position with sector agency staff, turning passive beneficiaries into active, demanding clients. Project designers need to think purposefully about rules of access and information dissemination from the start of project design.

Governments need to re-orient their role to act as promoters and facilitators, that is, to be responsive to users' demands. Shifting the sector from a supply to a demand orientation will require (a) developing the institutional capacity to work with WASAs, and (b) devising alternative incentive structures that enable service provision and production decisions to be made based on what consumers want and are willing to pay for. Institutional capacity requires a greater flexibility. This can be achieved through a learning approach that can be developed using a number of means, all of which require public officials to evaluate institutional changes collaboratively with the assistance of paraprofessionals, intermediary NGOs, small private firms, and communities. This requires a change in attitudes and practices in national governments, as well as in multilateral and bilateral donor institutions.

The difficult task is changing how sector agencies do business. Regional projects and special project units that develop effective approaches for working with WASAs can initiate this change. Supportive policies that enable WASA formation; allow the creation of WASA federations; and alleviate legal bottlenecks, such as land tenure, easement, and legal standing issues, are also essential.

Ultimately, however, change will only be facilitated if the rule structure creates incentives for users of the services to exercise voice on as many facets of choice as possible: on service levels, on WASA organizational arrangements, on how costs recovery methods, and on how construction crews are to maintain the quality of workmanship. What this review boils down to is the two fundamental messages of the World Bank's (1993) Water Resources Management Policy Paper services should be provided based on what people want and are willing to pay for, and service

organization should be managed at the lowest appropriate level. With a careful design of institutional rules WASAs could fulfill both these functions.

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ISBN 0-8213-3855-2