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NEWS

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Water as an Economic Good

The idea of treating water as an economic good has wide support. But the role of water—as a basic need, a merit good, and a social, economic, financial, and environmental resource—makes the selection of an appropriate set of prices exceptionally difficult. Also, the application of price-based instruments is particularly difficult in the case of water. This is because the flow of water through a water basin is complex, and provides wide scope for external influences, market failures, and high transaction costs.

DIFFERENT VALUES OF WATER

In countries where irrigation is practiced, irrigated agriculture is the largest consumer of water. The policies governing the use of water in irrigated agriculture are fraught with disagreements. Questions arise about whether water should be treated as a purely private good, a public good, or a basic human need. When should water be treated in one way rather than in the other, and what are the most cost-effective allocation policies in each case?

Economic analyses can help identify the basic issues with more precision. They can do this by analyzing the different values in terms of their marginal value rather than their total value. Markets reflect marginal values and function best where values are relatively stable, or change progressively. Water is different. In some cases, the marginal utility of water is very high—in a drought or at the end of a season, for example, when a reservoir is almost dry and farmers still require water. In other cases, the marginal utility of water is very low. Once a crop receives enough water to sufficiently alleviate physical stress and strain, for example, the utility of additional units rapidly plummets.

Value judgments have important implications. Take the following instance. Most people would agree that there is an obligation for society to assure reasonable levels of water, food, shelter, and medical care to ensure that basic human needs are met. But most people would agree that it is not reasonable to assist individuals or families in the acquisition of goods beyond this level. This suggests that the same goods should be treated differently at different levels of consumption. There are clear implications of this for water, including irrigation water. Supply of water at a level of basic needs is an obligation of society to provide irrespective of the ability to pay. At a higher level of supply, consumer's sovereignty should rule.

FAILURES IN THE PUBLIC AND MARKET SECTORS

Whether in irrigation, or in domestic and industrial water supplies, or in protecting resources and environmental quality, the public sector has not generally managed water very well. The problems experienced in the management and allocation of water by the public sector have inspired the movement towards alternative institutional arrangements for water management such as privatizing irrigation systems, and introducting service-related water charges, volumetric pricing, water markets, and tradable wa-

Name of IIMI to Change Soon

As many of you know, IIMI will soon have a new name—the International Water Management Institute (IWMI). Our Board of Governors approved the name change at its November 1997 meeting. However, as the Institute is incorporated under an act of parliament by our host country government, Sri Lanka, we have to obtain the necessary approvals for the name change. This process is well in hand.

Why are we changing our name? Over the last few years, research at IIMI has evolved from an exclusive focus on irrigation management to the broader issues of integrated water resources management at river-basin and national levels.

One reason for this evolution is that it is impossible to fully comprehend water utilization by irrigation without understanding the river basin system as a whole. River basins are highly integrated hydrological systems with the same water flowing and recycling through the agricultural, domestic, industrial, and environmental sectors.

Another reason for this evolution is that, with the increasing scarcity of water, competition among water using sectors is intensifying and it is necessary to understand water management in all the sectors to govern competition among them.

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ter rights. Market failures are common, and in irrigation and water resource management the problems fall into three major categories:

- *Externalities*. These are uncompensated costs or benefits incurred by one party by virtue of the activities of another party.
- *Transaction costs*. In many irrigation projects, the physical and management infrastructure required to allow delivery of water to serve market purposes—that is, to price water at its marginal cost—is entirely absent.
- *Property rights*. The single greatest problem in water resources management in the developing world is that property rights in water are very insecure and ineffective.

SOLUTIONS FOR IMPROVED WATER RESOURCES MANAGEMENT

It is proposed that market forces should be introduced into the process of allocating water. To do so, a number of necessary and sequential sets of preconditions will be required (see box). Although these preconditions can be judiciously applied and are expected to provide benefits, the necessary and sufficient conditions—especially defined and enforced water rights—are, in many cases, not yet in place. If attention is turned towards this approach, the returns are likely to be high. On the other hand, if such economic approaches are pursued in the absence of these preconditions, the effects may be unpredictable and possibly negative.

PRECONDITIONS FOR INTRODUCTING MARKET FORCES INTO THE ALLOCATION OF WATER

- the entitlements of all users under all levels of resource availability are defined and include specified assignments to social and environmental uses
- infrastructure is in place to deliver the defined entitlements
- measurement standards are acceptable to the delivering agency and users
- effective recourse is available to those who do not receive their entitlements
- reallocations of water can be measured and delivered, and third-party impacts (in quality, time, quantity, and place) can be identified
- effective recourse is available to third parties affected by changes in use
- users must be legally obligated to pay defined user fees through effective legal and policy procedures
- large-scale transfers of water with and between sectors must be subject to approval and relevant charges by regulatory agencies

This is an abstract of IIMI's Research Report 14, *Water and an Economic Good: A Solution, or a Problem*, by Perry, C. J., David Seckler and Michael Rock. The full text of this report may be obtained by writing to IIMI or accessed electronically on IIMI's home page at http://www.cgiar.org/iimi.

Workshop on the Use of Remote Sensing to Assess Irrigation System Performance

The results of using satellite remote sensing to assess the performance of irrigation systems were presented by IIMI and its key partners, the National Remote Sensing Agency (NRSA) in India and the International Institute for Aerospace Survey and Earth Sciences (ITC) in the Netherlands, at a workshop at the Center for Soil and Mechanical Research, Delhi, India. The workshop, conducted on 26 March 1998, was hosted by the Central Water Commission (CWC) and was attended by over 50 people from several government, private, and donor agencies in India.

Presentations were given on: performance assessment; the details of remote sensing techniques and their application in assessing crop yields, irrigated area, and evapotranspiration; and how to estimate the overall performance of irrigation systems by combining remotely sensed data with other information.

The results of applying the remote sensing techniques to assess actual irrigation system performance for wheat production in the Bhakra Project, Haryana State and for rice production in the Bhadra Project, Karnataka State were presented and discussed.

The workshop was successful in conveying to the participants the usefulness of using remote sensing as an important tool for performance studies. IIMI and its partners reaffirmed their willingness to work in collaboration with the national agencies in the application of these techniques to help them increase the food security of the region.

Water Management and the Bundala National Park, Sri Lanka

The Malala and Embilikala saline lagoons—forming the heart of the only wetland of international importance in Sri Lanka—are filling with fresh water and becoming clogged with green algae. The Bundala National Park, covering over 6,000 hectares of lowland, is located along the south coast of Sri Lanka and is home to important populations of water birds, elephants, turtles, and other wildlife. Nearby, there are several hundred farmers whose livelihoods depend on prawns. All have been seriously threatened by the extra quantities of fresh water draining from the Kirindi Oya Irrigation and Settlement Project.

To begin to resolve these problems, IIMI, together with the Irrigation Department, the Department of Wildlife Conservation, the Central Environment Authority, the National Aquatic Resources Agency, the Universities of Colombo and Peradeniya, and several NGOs conducted a one-day workshop on 3 April 1998 to discuss the issues. The key objectives of the meeting were to discuss how to initiate joint studies that will assess the impact of upstream water management on the ecology of the Bundala National Park, identify the water management options to improve the ecosystem and better serve the interests of the farmers and wildlife, and to provide assistance to the relevant policy makers to ensure the long-term conservation of Bundala.

STAFF AND VISITORS

NEW RESEARCH STAFF

- *Geoff Kite,* a Canadian, joined IIMI's office in Turkey in November 1997. In Turkey, Geoff is involved in using remote sensing and GIS for modeling water basins for improved water resources planning and management. Geoff has over 30 years' experience in hydrology and water resources engineering and has worked for government agencies, international agencies, and consulting companies in 17 countries in North America, Europe, Africa, and Asia. Geoff holds a Ph.D. in Water Resources Engineering from the University of Ottawa, Canada, and a master's degree in hydrology from Colorado State University.

- *Peter Droogers*, a postdoctoral scientist from the Netherlands, joined IIMI's office in Turkey in October 1997. Peter is also involved with the work on the use of remote sensing and GIS for modeling water basins for improved water resources planning and management. Peter holds a Ph.D. in Soil-Water Dynamics from Wageningen Agricultural University, where he worked on the development of simulation models for water dynamics, crop growth, agrometeorology, and nutrient dynamics for improved farm management.

- *Christopher Scott*, an American citizen, holds an M.S. and a Ph.D. in Hydrology from Cornell University, USA. Chris joined IIMI's office in Mexico in October 1997 and works on water resources, inter-sectoral competition, and water quality in the Rio Lerma basin. Before joining IIMI, Chris worked as a Research Associate at Cornell on hydrology and water quality in New York City's Catskills watershed. He has lived and worked in India, Nepal, and Honduras.

- *Jacobijn van Etten*, from The Netherlands, joined IIMI headquarters in Sri Lanka in February 1998 as an Associate Expert to work on the gender and water component of the institute's Policy, Institutions and Management program. Jacobijn received her M.Sc. in Irrigation Science from Wageningen Agricultural University in 1993. Before joining IIMI Jacobijn worked for a local NGO in the Zambezia province in Mozambique where she focused on capacity building and institutional development of a farmers' association.

IIMI FELLOWS

IIMI Fellows are internationally recognized experts in their fields who each year commit part of their time directly to IIMI's research activities. Five Fellows have visited IIMI recently:

- *Bert Smedema,* an engineer and Theme Manager of the International Program for Technology Research in Irrigation and Drainage (IPTRID), came in April this year to complete his work on the comparative study of the salinity balances of five major river basins.
- *Wim Bastiaanssen* from the International Institute for Aerospace Survey and Earth Sciences (ITC), the Netherlands came to IIMI in March. Wim came for discussions on the further development of IIMI's program on the use of remote sensing in assessing the performance of irrigation and water resources management.
- *Terry Heiler* of Heiler Associates, Christchurch, New Zealand became an IIMI Fellow in March 1998. Since retiring as Director, New Zealand Agricultural Engineering Institute, Lincoln University in 1993, Terry has worked in international and local consultancies on a full-time basis. Since 1971, Terry has completed over 30 international development projects for multilateral credit organizations, bilateral donors, developing-country governments, and private sector companies in the field of water resources development for agriculture. Terry visited IIMI for 2 weeks in March 1998 to help the institute develop its concept note on an outreach program.
- *Mark Rosegrant,* an economist at the International Food Policy Research Institute (IFPRI), was here for 2 weeks in January to obtain IIMI's input into the World Water Council's proposals for Vision for Water, Life, and the Environment. In addition to being an IIMI Fellow, Mark is leading the WWC's Task Group on Water for Food Security, Agriculture, and Fisheries.
- *Rod Vissia*, a consultant in water resources management residing in Ocean Shores, Washington, USA became an IIMI Fellow in January 1998. Rod spent much of his career with the US Bureau of Reclamation, holding the positions of Regional Director for the Pacific Northwest Region and Assistant Commissioner of Engineering and Research before leaving for the World Bank to assist the Government of Egypt in the development of a National Water Plan. Rod has worked as a consultant for IIMI, private firms, and the World Bank, in many developing countries. In April and May this year, Rod represented IIMI at the DSE-sponsored "Strategy Workshop on Institutional Reform and Cooperation in Irrigated Agriculture in Lao PDR and Viet Nam" held in Lao PDR, and assisted in developing a detailed work plan for a proposal "Research Program on Institutional Support Systems for Sustainable Management of Irrigation in Water-Short Basins."

BOOKSHOP

RESEARCH REPORTS

- Sakthivadivel, R., Nihal Fernando and Jeffrey D. Brewer. 1997. *Rehabilitation Planning for Small Tanks in Cascades: A Methodology Based on Rapid Assessment*. Research Report 13.
- Rock, Michael, C.J. Perry and D. Seckler. 1997. *Water as an Economic Good: A Solution, or a Problem?* Research Report 14.
- Kloezen, Wim H., Carlos Garcés-Restrepo and Sam H. Johnson III. 1998. *Impact Assessment of Irrigation Management Transfer in the Alto Rio Lerma Irrigation District, Mexico*. Research Report 15.
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- Bandaragoda, D. J. 1998. *Design and Practice of Water Allocation Rules: Lessons from Warabandi in Pakistan's Punjab*. Research Report 17.
- Amarasinghe, Upali A., R. Sakthivadivel and Hammond Murray-Rust. 1998. *Impact Assessment of Rehabilitation Intervention in the Gal Oya Left Bank*. Research Report 18.

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- Kloezen, Wim H. and Carlos Garcés-Restrepo. 1998. *Assessing Irrigation Performance with Comparative Indicators: The Case of the Alto Rio Lerma Irrigation District, Mexico*. Research Report 22.

- Levine, G., A. Cruz, D. Garcia, C. Garcés-Restrepo and S. Johnson III. *Performance of Two Transferred Modules in the Region Lagunera Irrigation District: Water Relations*. Research Report 23 (Forthcoming).

- Perry, C. J. and S. G. Narayanamurthy. *Farmer Response to Rationed and Uncertain Irrigation Supplies.* Research Report 24 (Forthcoming).

SWIM PAPERS

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- Kijne, Jacob, W., S. A. Prathapar, M.C.S. Wopereis and K.L.Sahrawat. 1998. *How to Manage Salinity in Irrigated Lands: A Selective Review with Particular Reference to Irrigation in Developing Countries*. SWIM Paper 2.

- I.R. Calder. *Water Resoures and Land Use Issues*. SWIM Paper 3. (Forthcoming).

- Batchelor, C. J. Cain, F. Farquharson and J.Roberts. *Improving Water Utilization from a Catchment Perspective*. SWIM Paper 4 (Forthcoming).

BOOKS

- Merrey, Douglas J. 1998. *Expanding the Frontiers of Irrigation Management Research: Results of Research and Development at the International Irrigation Management Institute, 1984 to 1995*. Colombo, Sri Lanka: IIMI. 217p.

- Bastiaanssen, W. G. M. *Use of Information from Satellite Remote Sensing to Support the Management of Irrigated River Basins*. (Forthcoming).

- Horst, Lucas. *The Dilemmas of Water Division: Considerations and Criteria for Irrigation System Design*. (Forthcoming).

BOOK REVIEW

Managing Salinization: Institutional Analysis of Public Irrigation Systems, by Waltina Scheumann. Berlin: Springer, 1997.

For several decades the causes of salinization of soils and aquifers in irrigation systems, and the technical solutions to the problem, have been well known and documented. Operation and maintenance (O&M) manuals and experts' reports prescribing solutions to salinization are plentiful and continue to be promulgated by engineers. Research elaborating on salt-water-land behavior continues. Despite these efforts, salinization and its frequent companion, waterlogging, continue to spread and render land uncultivable over large areas of Pakistan, India, Iran, Central Asia, Northwest China, and elsewhere.

Dr. Scheumann's book asks and explains why this is so, at least for the Lower Seyhan Irrigation Project in southern Turkey. She applies an institutional economic analysis to explain why a highly centralized irrigation and drainage bureaucracy dealing with disparate farmer groups is wholly incapable of stopping the advance of salinization and rising groundwater levels. The agency's budget is allocated from central revenues, irrespective of management performance. Staff are not rewarded for good performance. They are arguably under-paid and beyond the reach of central control and accountability. The agency is not accountable to farmers. Farmers lack common property rights. The creeping problem of salinization and rising groundwater levels is dispersed and gradual and is not susceptible to quick technical fixes. Consequently, maintenance of drainage facilities is a last priority in an already under-financed O&M budget. Since O&M are heavily subsidized, the relatively small amount of water charges collected from farmers has no effect on budgetary allocations.

The book presents evidence that where water management has been devolved to water users groups, new water allocation rules have been in-

troduced and water distribution has improved. But, since drainage systems remain under centralized agency control, management transfer has apparently had no effect on salinization. Data for several years are presented on trends in salinization, groundwater levels, agricultural productivity, O&M expenditures, costs of irrigation to farmers, and agency decision-making priorities.

The book is one of too few studies that go inside irrigation bureaucracies to document why they are dysfunctional, and in the process, show us why institutional reform, rather than incremental technical enhancement, is where the emphasis is needed today. More such research is needed, especially about the incentives and disincentives towards investments in drainage systems and their maintenance, both at system and on-farm levels. Evidence is needed about the effects of strong farmer organizations on such investments and their effects on salinization and waterlogging.

Doug Vermillion, IIMI

CONJECTURES AND REFUTATIONS

During the International Drinking Water Supply and Sanitation Decade (1981–1990) and thereafter, important achievements have been made in providing safe drinking water to poor communities in developing countries. The strategy has been to exploit shallow groundwater resources making use of low-cost appropriate technologies such as standpipes.These structures are supposed to be maintained by the community for which village water committees are created. Despite the improvements, still more than a billion people in the developing world lack access to clean water and there are signs that further improvements using the same strategy are increasingly difficult. In all south Asian countries, groundwater is pumped for agricultural purposes at an alarming rate, in many instances causing shallow drinking water wells to fall dry. In the Pakistani provinces of Punjab and Sindh, there are large areas where groundwater is brackish and cannot be used for domestic purposes, not even for washing. In Bangladesh and the State of West Bengal in India, groundwater often has extremely high arsenic levels and people are at risk for the horrible effects of arsenic poisoning. In other areas of India and in Sri Lanka, millions of people drink water with a very high fluoride content, causing serious dental and skeletal malformations. Under the above conditions, it is necessary to revert to the use of surface water to provide drinking water to rural communities. In many areas, the most readily available surface water is from irrigation canals and reservoirs. In some cases such as in the brackish water zones of Pakistan with very low rainfall, there is no option but to use irrigation water for drinking and other domestic uses. There is, therefore, a close link between water for irrigation and water for domestic purposes. Despite the current rhetoric on "integrated water resources development," this link has hardly been recognized. Irrigation and drinking water continue to operate as separate sectors each with its own government departments, donor institutions, international organizations, and researchers. This sectoral approach is also visible at community level. In many areas where donors and NGOs have been particularly active, it is not uncommon to find villages with different committees for drinking water, irrigation water, livestock, agriculture, health, etc. What seems to be a more sustainable approach is to make use of the existing community structures and promote a single village development committee. This would include all the above sectors according to the communities' own priorities. In IIMI's work, the first important step should be to study the possibilities to integrate different committees and associations that deal with different water uses at community level.

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