

## REENGAGING IN AGRICULTURAL WATER MANAGEMENT

### Policy and Institutional Options for Decision Makers

BY: THE WATER FOR FOOD TEAM

Over the last forty years, demand for food in developing countries has increased more than threefold, and in response, these countries have increased their production of irrigated crops from two to fourfold. As a result, average yield has more than doubled for rice and maize, trebled for wheat, and quadrupled for fruits and vegetables. Water productivity has increased sharply during the same time. In fact, the water needed to produce food for one person halved from six m<sup>3</sup> per day to less than three m<sup>3</sup> per day.

However, these gains have been neither universally successful nor universal in scope. Governments led the expansion of large-scale irrigation, and the results have been mixed, with many supply-led and bureaucratic programs producing disappointing results. In many basins, water productivity remains startlingly low, and adoption of modern technology is slow. Furthermore, the environmental benefits were matched by environmental stresses—drainage problems, loss of

environmental water flows, pollution, and destruction of natural habitats—which grow as many countries approach the limits of water and land resources.

Much more can still be done. Rainfed areas, where most poor people live, and which have been largely bypassed by the Green Revolution and public investment, can benefit enhanced water management. And there is still some potential for expansion of the irrigated area, which could increase by up to 40 million hectares over the next twenty-five years.

As food demand increases, irrigated agriculture is expected to provide close to 60 percent of the extra food needed over the next twenty-five years. At the same time, however, the pace of irrigation expansion is slowing. Irrigated land area used to expand at two percent per year in the 1960s and 1970s, but shrank to barely one percent per year in the 1990s. Furthermore, the amount of water available for irrigation is also decreasing.

Faced with this situation, governments, farmers, and other stakeholders must make policy choices regarding the management of agricultural water. These choices must balance multi-sectoral demand for water, the environmental risks and benefits, and the balance between expansion and intensification.

A new report entitled *Reengaging in Agricultural Water Management: Challenges and Options* describes the changing context of demand and supply for agricultural water. It identifies the policy, institutional, and incentive reform options that will accelerate improvements in productivity and pro-poor growth in this sector. It articulates priorities for investment and indicates options for adjusting the respective roles of the public sector and other stakeholders. The report also sets out how agricultural water management can best be integrated upstream into water resources management policy formulation and downstream into agricultural economic management strategy.

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## Responding to the Challenges

How to meet ever rising demand for food while at the same time increasing farmer incomes, reducing poverty, and protecting the environment, all from an increasingly constrained water resource base, are the challenges facing agricultural water management. Below are some ways to respond to these challenges in some important development areas.

**FARMER'S NEEDS.** An irrigation farmer's most important need is to have access to a reliable water supply. For this, it is vital that farmers play a role in the management of the irrigation system. Farmer needs set the reform priorities for the management of irrigation systems: irrigation modernization, user participation, water rights, and demand-driven investment. For profitable farming, the farmer requires access to efficient input and output markets, and to cost-effective technology. Farmer needs thus also set the priorities for agricultural policy, especially on the two critical fronts of market development and research and technology transfer.

**LARGE- AND SMALL-TO-MEDIUM SCALE IRRIGATION INVESTMENTS.** There are many strengths and weaknesses of investments in large- and small-to-medium scale irrigation systems, and a number of options exist for improving returns to investment and farmer incomes. In *large scale irrigation*, simple models of construction and rehabilitation have in the past neglected institutional development. New "system modernization" approaches combine investment and institutional reforms. The aim of system modernization is a sustainable, efficient, and demand-responsive water delivery service through an integrated package of selective physical upgrading, agronomic improvements, and institutional changes. The institutional changes typically include a reduction in the role of governments in management and financing combined with service decentralization, agency accountability,



scheme financial autonomy and user involvement throughout. Irrigation modernization is often a relatively long process with changes sequenced and integrated according to the needs of each local situation. In *small- and medium-scale irrigation*, there are ways for improving profitability, particularly through community-driven approaches, investment financing mechanisms, and participatory irrigation management. In this regard, scheme management transfer should be considered only once water user associations have achieved financial autonomy.

### RAINFED AGRICULTURE.

Improving water management in rainfed agriculture would have very high pay backs, but solutions are not easy. Priorities for reform include research and the transfer of existing technology, the development of market outlets, and physical investment in rural infrastructure and in water control structures. Demand-driven, integrated approaches are most likely to succeed in improving this area.

**GROUNDWATER.** Where groundwater is the water source, unplanned mining has severe costs. There is a range of solutions, but for most countries the best immediate options are to strengthen existing water rights and promote self-regulation, supporting this by eliminating energy and pumping equipment subsidies and promoting water use efficiency. With these tools, countries may move toward more "planned depletion," allowing a less water-intensive economy to develop without severe shock or negative impacts on the poor.

## Policy and Institutional Options

Agricultural water management lies at the crossroads between four important areas of public policy: water resources, agriculture, rural development, and environment. Each area can make important contributions to



the development and productivity of agricultural water management. Regarding *water resources*, recommended policies are those which specifically support the adoption of integrated water resource management and basin planning, the setting of an incentive structure which promotes water productivity and the recognition and regularization of existing water rights, as well as the establishment of new water rights. Clear and secure water rights may be a preliminary step towards the development of water markets in the long term.

In *agricultural policy*, there is a potential conflict between targeting irrigated food production as a means of promoting food security, which may lock farmers into low return investments, and the need to maximize resource productivity and farmer incomes. Although no one policy can fit all situations, generally countries would do best to channel investment and water resources to the most profitable enterprises of the poor and to develop markets to serve them, rather than to subsidize food production itself. Therefore, the agricultural policy most supportive of irrigation would emphasize the development of internal and export markets, together with options for promoting research and technology transfer, particularly with private sector involvement.

*Rural development policies* target sustainable improvements in livelihoods. The impact of irrigated agriculture on poverty can be increased if investments in agricultural water management are designed specifically to target poverty reduction. However, poverty reduction approaches to irrigation need to be designed carefully to ensure that the resulting production system is profitable and sustainable under farmer management. Women are essential stakeholders in agricultural water management and are often a poverty target group widely disregarded in policy and programs. Irrigation development needs to identify the specific role of women and to build in interventions, including mechanisms of participation and inclusion, to improve the effectiveness of that role.

In *environmental policy*, more comprehensive mainstreaming of environmental concerns into all aspects of water management and agricultural policy is needed. The considerable global experience on managing environmental risks needs to be applied to both intensification and to expansion of irrigation. At the macroeconomic level, the incentive structure should reflect the

value of environmental goods and services. Expansion of irrigation should take place within basin plans, using safeguard approaches, and particular attention should be paid to protection of environmental flows and of groundwater resources.

At the *global* level, support should be available to help irrigation economies in developing countries adjust toward freer trade, and climate change should be factored into decisions on policy and investment. An agenda for both international and national research and technology transfer is needed. This agenda should focus on ways of increasing water productivity and on agricultural water management for rainfed farming, wherever possible in partnership with the private sector.

There are two key challenges for the *role of government* in agricultural water management. The first challenge is to improve government performance in core public sector tasks related to agricultural water management. These tasks include: setting a conducive economic framework, integrated water resources management, environmental protection, research and technology transfer, and rural infrastructure. The economic framework should promote the development of profitable markets for irrigated produce and the incentive structure and government budget support should promote the policy goals of water use productivity, farming profitability and poverty reduction. The second challenge is to reduce the role of government where it is not essential and to harness the energies of farmers and the private sector. Institutional options exist for broader engagement of these other stakeholders in agricultural water management in a process of decentralization and inclusion. These options range from corporatization of irrigation management agencies through increased accountability of service providers to development of user associations. A recent innovation is public-private partnership (PPP) in the management and development of irrigation schemes, an approach now being piloted in the Middle East and North Africa Region.

## Toward a new agricultural water management agenda

Agricultural water management is an input to farming and a key factor in farmer incomes, agricultural growth and exports, and poverty reduction. This economic context defines two underlying themes for the future of



agricultural water management: productivity of water use and the need for market-driven approaches. The following basic messages indicate how to apply these two themes to the future development and management of agricultural water:

- Agricultural water management has to be placed within an *integrated water resource management context* through integrated and participatory planning that assesses trade offs and ensures optimal use of water at the basin scale.
- A focus is required on ways to increase *water productivity* through a combination of institutional changes that empower the farmer, technological improvements, and investments to intensify and diversify agricultural production and increase farming profitability.
- There has to be a move towards *new institutional arrangements* which give more responsibility and say to farmers, engage the energy of the private sector, and reduce the role of government. The emphasis should be on decentralization, financial viability and accountability of water service providers, empowerment through rights and responsibilities of water users and their organizations, the use of incentives to reflect societal values, and innovative mechanisms to bring in the private sector.
- Many factors—policies, institutional change, and investments—need to be *integrated* to achieve efficient outcomes in all aspects of agricultural water management, from modernization of large-scale irrigation to rainfed agriculture. The sequencing and prioritization of change processes need attention, as well. At the macroeconomic level, policies and programs for water resources, agriculture, and environment need to be integrated. At the local level, investment needs to be based on profitable and sustainable farming and on workable institutional arrangements.
- To meet demand, there has to be both intensification and expansion of irrigation. Approaches to this have to be both *practical* and *sensitive to environmental and social concerns*, using participatory approaches and new methodologies to make sure that concerns are assessed and that responses enhance the economics and sustainability of investments.
- Increased attention is required to the potential for reducing poverty, and to the systematic factoring in of *poverty and gender concerns* to agricultural water programs. Where possible, irrigation and drainage investments should be targeted at poor areas, and projects should be designed with the needs and capabilities of the poor in mind.

These messages need to be adapted to regional and local situations through a process of dialogue and study that will produce programs of action.

### Selected reading:

*Shaping the Future of Water for Agriculture: A Sourcebook for Investment in Agricultural Water Management.* World Bank, Washington DC, 2005.

*Agricultural Growth and the Poor: An Agenda for Development.* Directions in Development Report. World Bank, Washington DC, 2005.

*Agriculture Investment Sourcebook.* World Bank, Washington DC. 2004.

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This note is a product of the Water for Food team. It was written by Christopher Ward, an independent consultant, and Salah Darghouth, a Water Advisor for the Agriculture and Rural Development Department at the World Bank. It is based on the *Directions in Development (DID)* report entitled *Reengaging in Agricultural Water Management*. Email ard@worldbank.org for a hard copy.

