

## SHAPING THE FUTURE OF WATER FOR AGRICULTURE

### Designing and Implementing Quality Investments in Agricultural Water Management

BY: THE WATER FOR FOOD TEAM

Irrigated agriculture has been vital to meeting fast rising food demand and has driven rural development and poverty reduction in developing countries, where the agricultural area under irrigation has doubled over the last forty years. Cereals output increased threefold between 1960 and 1999, while the production of irrigated fresh fruit and vegetables increased fivefold and now accounts for one-fifth of all developing country agricultural exports. More than two-thirds of this increase came from yield increases, and the water needed to feed each person fell by a half. This massive productivity increase was key to reducing world hunger—average daily calorie intake in the developing world went up from 2,054 calories in 1964 to 2,681 calories in 1999.



However, in recent years the pace of irrigation development has slowed as has donor support to the sector. World Bank lending for irrigation and drainage averaged about five percent of total lending in the 1970s and 1980s, but dropped to less than two percent in the early 2000s. In some countries, this reflects constraints to area expansion, in others there has been disappointment with the performance of past investments. There have been considerable technological advances, but the take up of new technology is slow. For instance, although drip technology is widely available, it is used on less than one percent of irrigated lands worldwide. Furthermore, the negative environmental impacts have sometimes been neglected.

Yet the challenge has never been greater. Pressures on agricultural water are intensifying as demand for increased rural incomes and for agricultural produce grows. The World Bank is working to meet these challenges through its three corporate strategies—for rural development, water resources, and environment—which underline the role of higher water productivity and sustainable resource use in rural development and poverty reduction. To achieve these goals, investment in agricultural water management will have to increase and its quality must improve.

In the report *Shaping the Future of Water for Agriculture: A Sourcebook for Investment in Agricultural Water Management* a range of solutions and good practices from World Bank and worldwide experience are documented to meet the challenges of agricultural water management. The Sourcebook has an operational focus, concentrating on investments in policy and institutional reforms and in technology and management to improve water productivity and farming profitability. It provides a basis for training of both specialists and non-specialists, enabling practitioners to see agricultural water management in its bigger context of poverty reduction, growth of livelihoods, and wealth creation. The Sourcebook outlines an



indicative picture of the messages that are priorities in different regions of the world. The real work of adaptation and implementation will begin as practitioners become familiar with the Sourcebook and apply it in developing countries.

## RESPONDING TO THE CHALLENGES

Below are specific recommendations to help practitioners design and implement quality investments in agricultural water management.

### Reforming policies and institutions

In the past, governments have been principal investors and service providers, and have promoted agricultural water use through subsidies, controlled markets and trade policy. Government planning and top-down solutions often led to poor investment choices, high costs, poor service, low cost recovery, and a culture of dependency on the state. Now, in many countries, poor irrigation performance, slow diversification and intensification, and growing environmental problems have prompted a shift towards a new public/private paradigm, a revised incentive framework, and a more market-oriented approach. Governments are progressively becoming facilitators and regulators, while users and markets play a growing role in investment, finance, and management.

Investment in policy reform can help define institutional and governance frameworks and establish incentive and market frameworks favorable to profitable irrigated agriculture. Investing in institutional development is also crucial. On the user side, this may entail investing in participatory irrigation management through water

user associations. On the service provision side, irrigation institutions need restructuring to increase their accountability and improve performance. In addition, the development of an increasingly knowledge- and skills-based agricultural and irrigation economy requires investment in capacity building.

### Improving the economic and financial framework for investment

Within agricultural water use, there is scope for improving returns to water. However, service providers often have scant incentives or accountability to deliver good service. Farmers have been faced with an array of prices and markets suffering from price distortions and subsidies, administrative decisions, and trade and other macroeconomic policies. The results have been risk aversion, slow adoption of new technologies and diversification, low cost recovery, and groundwater depletion and other environmental degradation. Distorted incentive structures have been at the root of poor water management. The incentive framework has to encourage farmers to invest and to manage water efficiently and sustainably.

Countries need to establish an economic and financial framework for profitable investment. Market-driven approaches are

necessary to improve investment in agricultural water. Policies are needed at the macro-economic level to encourage open trade and market development. Undistorted incentive frameworks are also needed, downplaying the use of subsidies and encouraging cost sharing wherever possible. In irrigation, the financial viability of water service providers is crucial, and water service charges, although often contentious, are ultimately to the benefit of the farmer. Cost recovery as a mechanism to finance a high level of water service would improve farmer incomes and investment outcomes.



## Increasing investment levels and improving outcomes

Worldwide, investment in irrigation has been declining as investment costs in new surface irrigation have risen and rates of return and investment performance have deteriorated. In particular, investment in on-farm water management has been constrained by distorted incentive frameworks and, despite good economic returns, drainage investments have been neglected.

There are ways to increase both private and public investment. A priority is to ensure that the policy and incentive environment for private investment is in place. In large-scale irrigation, where the public sector is usually involved because of the scale of investment, modernization approaches combine institutional changes with physical investments to target the service delivery goal of cost effective and timely water delivery.

The World Bank can improve the quality of its lending for agricultural water not only by the application of good practices, but also by the appropriate choice of lending instruments. Piloting of institutional or technical innovations may be done by Learning and Investment Loans (LILs); scaling up of good practices or financing of multi-functional operations may best be supported by Specific Investment Loans (SILs); and broad policy and institutional reforms may be promoted by a Development Policy Loan (DPL). World Bank safeguard policies can be viewed not as a constraint but as an aid to investment. Effectively, safeguards can help improve investment quality by integrating environmental and social issues into projects and by supporting participatory approaches and transparency.

## Investing in technology and water resources management to supply growing demand

Although the pace of technological change has slowed down, the scope for efficiency gains in irrigation is enormous. Efficiencies world wide are well below technical maxima, pressurized systems and protected agriculture still occupy only a small area, low-value staples predominate in cropping patterns, and agricultural yields and farmer incomes are well short of potential in most developing countries.

Application of an integrated approach to the different inputs to the production system—soil, water, agronomy

—would increase efficiency. Examples include—integrated water saving approaches to on-farm management, supplementary irrigation and surface-groundwater conjunctive use, combined water and soil fertility management, and integrated approaches to combating drought, salinity, and floods. Water saving technology for profitable investment exists in abundance but its adoption requires efficient knowledge transfer systems, reliable water service, and an economic environment that provides undistorted incentives, manageable risk and market access.



## Investing in agricultural water to meet the poverty and rural incomes challenge

Agricultural growth is central to poverty reduction. Seventy per cent of the world's poor live in rural areas, and most of them are dependent on agriculture. Investing in improved management of available water thus has a critical role to play in both poverty reduction and food security.

Participatory approaches and farmer empowerment play a central role in poverty reduction. An inclusive farmer organization is a powerful force for improving water management. Investment quality can be improved by participation at every level, bringing the voices of the rural poor to such areas as policy making, technology development, and drought management. Community driven development (CDD) approaches

can also be excellent investment vehicles for that. Investment in irrigation and other agricultural water management projects can be effective in reaching the poor, but care is needed to ensure a pro-poor element in programs, as a purely market-driven approach will favor the better off. Options for pro-poor investment include small scale irrigation, water conservation and watershed management, as well as programs to help poorer rainfed farmers such as investments in supplementary irrigation, water harvesting, rural infrastructure, credit and market development.

### **Factoring environmental dimensions and the sustainability imperative into investment**

Many countries are at the limit of water resources development, and pressure on land and water is intense. Over-abstraction of groundwater is leading to a drop in water tables and a decline in quality. Salinization and waterlogging have affected 30 million hectares worldwide, and a further half a million hectares go out of production each year, as much farm land as new irrigation creates. Drought and floods, exacerbated by climate change, have a heavy impact on agriculture, and particularly on the poor. In many countries, watersheds are degrading under multiple use.

Groundwater management is likely to be a significant investment area as resource mining problems grow worse. Options for recovering control over groundwater include introducing an incentive structure favorable to conservation, and creating a governance structure

that promotes self-management and responsibility. Strong economic logic exists for increasing investment in drainage, but this should be considered through its “multi-functional” dimensions. In watershed management, integrated and participatory approaches can have an impact on both soil and water conservation and on poverty reduction.

## **ASSISTANCE FROM THE WORLD BANK**

The World Bank Country Water Resources Assistance Strategy (CWRAS) provides a link between the World Bank’s program and national strategies, and opens opportunities for systematically building best practice approaches in agricultural water management into World Bank lending. The recommendations made in this note will also help in targeting sector and technical work and studies to strategic priorities and in identifying the appropriate World Bank lending and sector policy support instrument, depending on whether the priority is to support policy reform, long-term investment programs, free-standing investments, pilot projects, or emergency recovery. The application of the practices recommended here is thus also expected to help to revive and reorient the lending program. The range of possible investments is broad and should complement existing World Bank strengths of international expertise, cross-country experience, and multi-sectoral involvement, all directed towards the over-riding goal of poverty reduction and economic growth.

### **Selected reading:**

*Reengaging in Agricultural Water Management.* Directions in Development Report. 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.* Washington DC: World Bank, Agriculture and Rural Development Department.

This note is a product of the Water for Food team. It was written by Christopher Ward, an independent consultant, Ariel Dinar, a Lead Economist in the Agriculture and Rural Development Department at the World Bank, and Salah Darghouth, a Water Adviser for the Agriculture and Rural Development Department at the World Bank. It is based on the *Shaping the Future of Water for Agriculture: A Sourcebook for Investment in Agricultural Water Management*. The Sourcebook will be updated periodically and new notes on contemporary issues will be added. You can download a full copy of the report at [www.worldbank.org/rural](http://www.worldbank.org/rural) or email [ard@worldbank.org](mailto:ard@worldbank.org)

