



Water use in agriculture

As cities draw on more water resources for their rapidly growing populations, agriculture must significantly improve its water use efficiency and productivity

The productivity of irrigated land is approximately three times greater than that of rainfed land. Beyond that global fact, there are many more reasons for highlighting the role of water control in agriculture. Investing in irrigation development provides insurance against erratic rainfall and stabilizes agricultural output, boosting crop productivity and allowing farmers to diversify. This translates into increased and less volatile farm incomes.

In turn, a more predictable and stable production system has a positive effect on providers of services to the sector, increasing the non-farm multiplier effect of the investment. In addition, investment in water development increases the value of land. Small-scale water collection, irrigation and drainage works implemented with local labour are economically viable, and once the basic infrastructure has been put in place with public funding, further private investment also becomes viable. Additional indirect effects of investing in water development include improved nutrition throughout the year, a more active market in rural labour; reduced out-migration, and reduced agricultural pressure on marginal land.

Competition for water. In the absence of substantial claims for water from other sectors, and understanding of its environmental impacts, irrigated agriculture has been able to capture large volumes of freshwater. Today, agriculture represents 69 percent of all water withdrawal in the world, and this percentage rises above 90 percent in some arid countries. As such, agriculture has acted as a residual user of freshwater. The situation is changing as population increases and more and more countries face water shortages. By 2030, over 60 percent of the population will live in urban areas, claiming an increasing share of water abstraction.

The availability of sufficient amounts of water of good quality is fundamental to all biological processes, for maintenance of biodiversity and ecosystems, for human health, and for primary



and secondary production functions. Natural ecosystems and agriculture are by far the biggest consumers of the Earth's freshwater. Appropriations of water from ecosystems have intensified with human population growth, the expansion of agriculture and increasing pressure to transfer water from rural to urban areas, to the point where agriculture is often seen as jeopardizing ecosystem sustainability. These threatened ecosystems can no longer provide the water purifying and regulating services to sustain agricultural production and livelihoods.

There is an urgent need, therefore, to reconcile water demands for maintaining ecosystem functions and for producing food. Finding this balance is particularly important in developing countries, where agriculture and the natural environment are often the principle potential "growth engines", and the key to alleviating poverty and reducing hunger.

Of all freshwater use sectors, agriculture in most cases shows the lowest return on water in economic terms. As the stress on water resources increases, competition grows between agriculture fighting to retain its water allocations and cities needing to satisfy the needs of their rapidly growing populations. Water stress and the pressing need to renegotiate inter-sectoral allocations are usually factors that force changes in the way water is managed in agriculture.

Declining water quality adds to the stress on supply. In developing countries, water diverted to cities is often released after use without adequate treatment. In arid areas, return flow from agriculture itself and multiple reuses of water lead to a rapid degradation in quality. In many islands and coastal areas, the development of tourism adds to the burden on scarce water resources, but it also brings new market opportunities for diversified and high value production, including vegetables and fruits.

The scope and need exist therefore for rapid increase in agriculture's water productivity. Carefully designed water management strategies, associated with programmes aiming at improving the efficiency and productivity of water use need to be put in place. Pressurized irrigation conveyance systems, associated with localized irrigation technologies and the promotion of high return agricultural produces should be part of such strategy. Systematic collection, treatment and re-use of urban wastewater for agricultural production, associated with the development of enhanced monitoring, health protection and education programs for wastewater reuse in agriculture offer new opportunities for irrigation in conditions of water scarcity.

Poverty reduction. Irrigation impacts more on poverty in some settings than in others, depending on a number of conditioning factors, including the structure of land and water distribution, land tenure, irrigation infrastructure and its management, technologies in place, and access to support measures such as information and marketing. Improved equity and security in access and rights to land and irrigation resources matter for larger poverty impacts: where land and water equity exists, irrigation has greater poverty-reducing impacts. Addressing gender equity in access to land and water, particularly women's rights to hold irrigated land and control the distribution of produce, have been shown to make significant differences in family's nutrition and the income of female-headed households.

Evidence shows that the poverty-reducing impacts of irrigation-related interventions are larger when they are implemented in an integrated framework - for example, integrated approaches for managing surface water and groundwater (conjunctive use, developing systems that allow multiple uses of irrigation water, new investments in improving irrigation infrastructure and irrigation management, and provision of inputs, technologies, information, finance and marketing. Investments in irrigation improvement that allow for multiple uses - such as domestic water supply, irrigation, and other farm and non-farm uses of water - may have higher positive impact than separate investments. These multiple uses bring significant benefits and contributions to livelihoods, especially for poor households.

Where opportunities for irrigation with affordable technology exist, a priority option is private sector marketing of technologies. There is a range of irrigation application and resource conserving technologies, and improved production practices that offer promise for improving productivity and returns to farming by the poor. These include, for example, improved system of water delivery and control, micro-irrigation systems, adapted water lifting technologies, and on-farm water conserving technologies like zero tillage, water harvesting, or runoff farming.

The potential benefits of these innovative systems and technologies to the poor can be enhanced through initial targeted subsidy schemes for the poor, targeted training opportunities to enhance the skill and knowledge of water users, encouraging private participation in the supply chain of the needed inputs for the systems, focus on developing low pay-back period technologies; and strengthened public research on systems for further improvement.