

Increasing Productivity of Water: A Requirement for Food and Environmental Security

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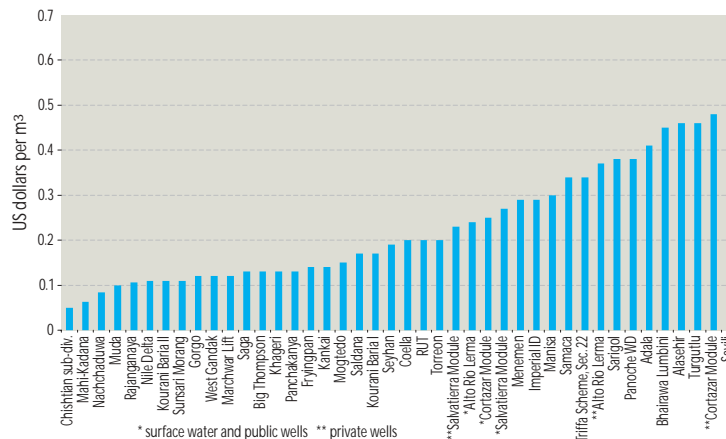
Research Program:
Comprehensive Assessment of
Water Management in Agriculture

How much irrigation we really need is probably the most important, yet unresolved, question in the water for food and environmental security arena. Over time, as the value of water rises, there is more pressure to move water out of agriculture into higher-valued urban and industrial uses. In many cases, both agriculture and nature are the residual users—getting water after the needs of uses that are higher-valued are met. Thus, the area of water stress and conflict that is likely to intensify the most is not between cities and agriculture but rather between nature and agriculture.

Increasing the productivity of water in agriculture is a critical consideration because, simply stated, the more we produce with the same amount of water, the less the water is needed to meet future irrigation demands and the more water that is available for the environment and other uses. This includes improving productivity of water in both rain-fed and irrigated areas.

The purpose of this article is to demonstrate why the productivity of water is necessary for food and environmental security. We show that more food can be produced with less water, thus leaving water available for other environmental uses. The key opportunities to improve water productivity are to increase productivity on irrigated lands and to use water to supplement rainfall in marginal areas. To achieve maximum benefit from these changes, our approach to water management must also change. What is needed is a form of comanagement that can balance the water demands of agriculture and those of the environment, instead of considering the needs of each sector in isolation.

Differences in the productivity of water in 42 irrigation systems



Considering the productivity in 42 irrigation systems worldwide, IWMI research demonstrated a tenfold difference in the productivity of water (measured as gross value of output per unit of water consumed). Some of this difference is due to the price of grain versus high-valued crops, but the large differences seen even among grain-producing areas suggest there is a large scope to improve the productivity of water in many areas.



The challenges for water management as outlined in this paper are:

Improving the productivity of water on existing irrigated lands through water-saving practices or by increasing the productivity of water consumed by the agricultural process. Within irrigation there is tremendous scope for improving the productivity of water.

Improving the productivity of water in areas that are primarily rain-fed through supplemental irrigation. There are a number of water harvesting, groundwater use, storage and water application practices being developed that have potential to raise the productivity of water in these areas. Many of these practices are particularly suitable for use by smallholder farmers and can go a long way in the fight against poverty.

Comanaging water for agriculture and nature. We feel that there are ample opportunities for the comanagement of water for food and nature. Supplies that have already been exploited through water resources development can be used to meet ecosystem and agricultural requirements.

In irrigated agriculture, improving the productivity of water can be defined as the physical output per unit of water depleted—meaning that water is rendered unavailable for uses further downstream. It can be expressed in kg of yield/m³ of water. In many areas, the potential productivity of water is not realized and this is, in large part, due to poor irrigation management. Without stable irrigation deliveries, farmers cannot take advantage of production potential.

Another appealing option is to increase the productivity from rain-fed agriculture through water harvesting and supplemental irrigation. Giving one irrigation turn at the right time can tremendously increase land yield and the productivity of water. In marginal areas—where rainfall is not reliable for full production, and access to full irrigation is difficult or expensive—supplemental irrigation may hold an important key to the productivity of water.

One of the challenges of water management is to shift from managing water to meet one need—water for environment or water for agriculture—to integrated water resources management, i.e., managing water resources to meet a variety of needs.

