

Managing water for rainfed agriculture

Upgrading rainfed agriculture promises large social, economic and environmental paybacks.

Most poor communities around the world rely on rainfed agriculture for their food, where yields are often much lower than they could be, partly due to inadequate or ineffective water management practices. Farmers, people in rural communities, policymakers, governments and non-governmental organizations (NGOs) must work together to disseminate better methods of boosting yields from rainfed systems, reducing hunger and increasing wealth.

Key messages

- Improving agricultural productivity in areas dependent on rainfall has the greatest potential to reduce poverty.
- Managing rainwater and soil moisture more effectively and using supplemental and small-scale irrigation hold the key to helping the greatest number of poor people.
- Agricultural water management solutions are an entry point for improving ecosystem functions in agroecosystems of the semiarid tropics.

The context

Rainfed agriculture produces much of the food consumed by poor communities in developing countries. It accounts for more than 95% of farmed land in sub-Saharan Africa; 90% in Latin America; 75% in the Near East and North Africa; 65% in East Asia; and 60% in South Asia. Water productivity, 'the volume of crop produced per drop', tends to be low in rainfed farming systems, while losses from evaporation are high. Land is often degraded, crops frequently die because of drought or floods and few methods are in place for managing water more effectively. In parts of sub-Saharan Africa and South Asia, productivity is particularly low, which results in food insecurity and poverty for rural communities.

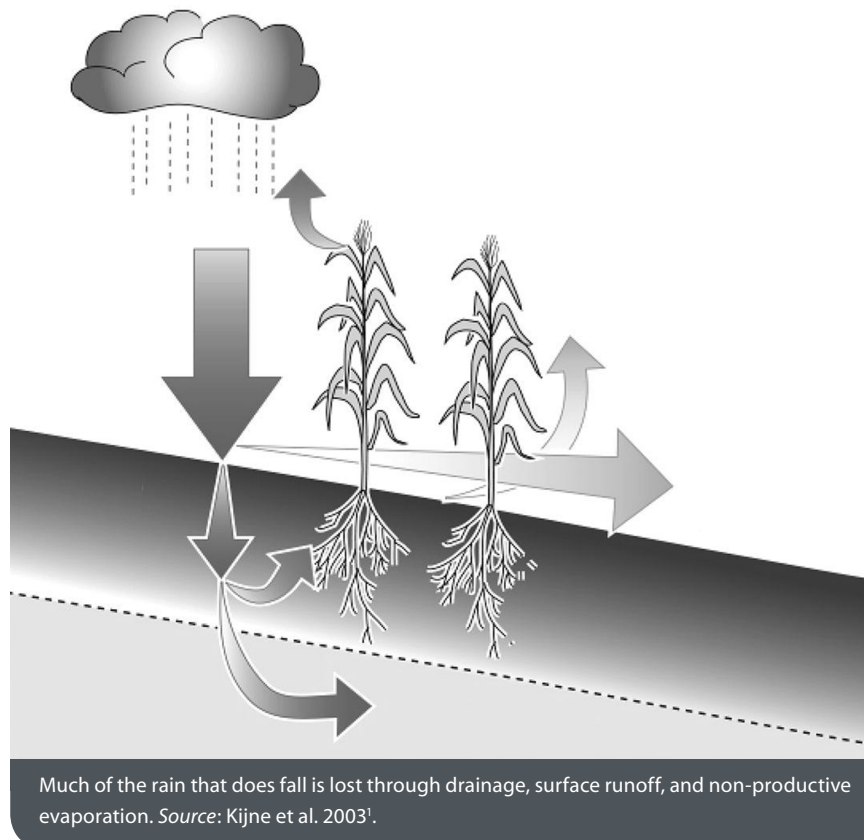
IWMI's position on rainfed irrigation

IWMI conducted a major investigation into the world's current and future water needs, and published its findings in 2007 in the book, *Water for food, Water for life: A comprehensive assessment of water management in agriculture*. The research included a study of rainfed agriculture. It noted that there is a close correlation between hunger, poverty and water. The challenge is to reduce water-related risks posed by high rainfall variability rather than coping with an absolute lack of water. It noted that little investment has been made in rainfed systems in the past 50 years and called for a new era of water investments and policy for upgrading rainfed agriculture; one that goes beyond field level soil and water management and adds new freshwater through local management of rainfall and runoff. It also noted that investments in rainfed agriculture have

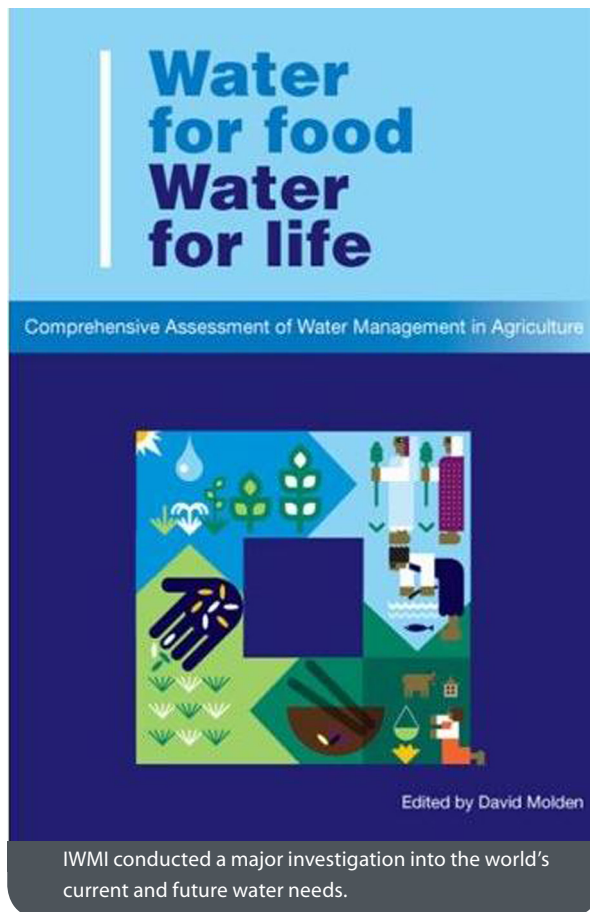
large payoffs in terms of improvements in yield and poverty alleviation through income generation and environmental sustainability.

Action needed

Managing rainwater and soil moisture more effectively and using supplemental and small-scale irrigation hold the key to helping the greatest number of poor people. Actions such as these cut losses from dry spells, which claim one in five harvests in sub-Saharan Africa. A more assured harvest gives farmers the security they need to risk investing in other productivity-boosting technologies, such as fertilizers and high-yielding seed varieties. Irrigation can also allow farmers to grow a second, often higher-value, crop, such as fruits and vegetables that are more sensitive to water-stress and require costlier inputs. Once farmers are able to grow more lucrative crops, they are on the road to livelihood and food security.



¹Kijne, J. W.; Barker, R.; Molden, D. (Eds.). 2003. *Water productivity in agriculture: limits and opportunities for improvement*. Wallingford, UK: CABI; Colombo, Sri Lanka: International Water Management Institute (IWMI). xix, 332p. (Comprehensive Assessment of Water Management in Agriculture Series 1).



An important message emerging from research conducted by IWMI and partners in sub-Saharan Africa is that water management innovations can contribute to improved livelihoods among smallholders in semiarid regions, both directly by improving yield levels and indirectly by maintaining on-farm productivity. These innovations are also an entry point for improving other ecosystem functions in frequently degraded or threatened agroecosystems of the semiarid tropics. Thus, there is great potential to concurrently increase food production and maintain or improve ecosystem services in these environments.

In rainfed farming landscapes, water productivity is often low due to land degradation that results in high levels of evaporation and runoff, thus little benefit is gained from water. Focusing on sustainable management of the land by supporting local communities has, therefore, a potentially huge direct

benefit of gaining more productivity per drop of water. IWMI's work on mixed crop-livestock systems in sub-Saharan Africa has also shown that integrating the management of water needed for the various components of farming systems can yield big payoffs by making scarce water yield more benefits.

A global study by IWMI scientists gathered evidence on improved productivity in 438 recent cases from 57 countries, across 11 million farms and covering 32 million hectares. The researchers observed productivity increases and increased ecosystem services derived or supported by the landscape, following the introduction of resource-conserving farming technologies across a wide range of farming systems. These technologies include small-scale irrigation, organic farming to increase soil organic matter, water harvesting in dryland areas, improving soil structure (for example, by adding clay) so more water and nutrients are retained, and integrated pest management to reduce the need for pesticides.

How IWMI can help

IWMI works with partners to help farmers adapt and adopt water management practices to boost yield from rainfed systems and alleviate poverty. One project, that began in 2009 and is continuing through to 2011, aims to unlock the potential of smallholder farms in Africa's Burkina Faso, Ethiopia, Ghana, Tanzania and Zambia, and the two Indian states of Madhya Pradesh and West Bengal. The project is identifying how and where investments need to be made to achieve maximum increases in incomes and reductions in poverty and hunger using a range of agricultural water management methods and technologies.

Another set of projects, funded by the CGIAR Challenge Program on Water and Food (CPWF), began in 2010 and are continuing through to 2013, will provide ways to upgrade the overall landscape function in degraded agroecosystems in Ethiopia, improve livelihoods and also boost water productivity and ecosystem functioning to sustain the required range of services that support multiple livelihood strategies. These projects will help policymakers to develop effective strategies, donors to better target support, government agencies and NGOs to design sustainable rural development programs, and will help farming communities to adopt appropriate agricultural water management technologies and practices.

Source

This Water Issue Brief is based on the following publications:

Bossio, D.; Geheb, K. (eds.). 2008. *Conserving land, protecting water*. Wallingford, UK: CABI; Colombo, Sri Lanka: International Water Management Institute (IWMI); Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food. 235p. (Comprehensive Assessment of Water Management in Agriculture Series 6).

Bossio, D. A.; Noble, A.; Molden, D.; Nangia, v. 2008. Land degradation and water productivity in agricultural landscapes. In: Bossio, D. A.; Geheb, K. (eds.), *Conserving Land, Protecting Water*. Comprehensive Assessment of Water Management in Agriculture Series 6. Wallingford, UK: CABI Publishing, pp. 20-32.

Droogers, P.; Seckler, D.; Makin, I. 2001. *Estimating the potential of rain-fed agriculture*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 19p. (IWMI Working Paper 020).

Wani, S. P.; Rockström, J.; Oweis, T. (Eds.). 2009. *Rainfed agriculture: unlocking the potential*. Wallingford, UK: CABI; Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); Colombo, Sri Lanka: International Water Management Institute (IWMI). 310p. (Comprehensive Assessment of Water Management in Agriculture Series 7)

Related IWMI publications

Open access (electronic version freely accessible via the internet)

Bhatt, Y.; Bossio, D.; Enfors, E.; Gordon, L.; Kongo, V.; Kosgei, J. R.; Makurira, H.; Masuki, K.; Mul, M.; Tumbo, S. D. 2006. *Smallholder system innovations in integrated watershed management (SSI): strategies of water for food and environmental security in drought-prone tropical and subtropical agro-ecosystems*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 59p. (IWMI Working Paper 109; SSI Working Paper 1)

Bossio D.; Noble, A.; Aloysius, N.; Pretty, J.; Penning de Vries, F. 2008. Ecosystem benefits of 'Bright Spots'. In: Bossio, D. A.; Geheb, K. (eds), *Conserving Land, Protecting Water*. Wallingford, UK: CABI; Colombo, Sri Lanka: International Water Management Institute (IWMI); Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food (CPWF). pp.205-224. (Comprehensive Assessment of Water Management in Agriculture Series 6)

UNESCO-IHE Institute for Water Education; International Water Management Institute (IWMI); Sokoine University of Agriculture; University of Kwazulu Natal; Stockholm University. 2007. *Science for development decision makers*. Smallholder System Innovations (SSI) in Integrated Watershed Management Policy Brief. 4p.

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