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Putting Research Knowledge into Action

Water storage

Rainfall variability is a key constraint to agricultural production and economic growth in many developing countries.

This is likely to be exacerbated in many places as rainfall variability is amplified as a result of climate change. Water storage, in its various forms, provides a mechanism for dealing with variability which, if planned and managed correctly, increases water security, agricultural productivity and adaptive capacity.

Key messages

- Water storage can make an important contribution to safeguarding livelihoods and reducing rural poverty.
- Ill-conceived water storage is a waste of financial resources and, rather than mitigate, may aggravate unpleasant climate change impacts.
- Systems that combine complementary storage options are likely to be more adaptable and acceptable than those based on a single storage type.
- More systematic planning and management is required to ensure 'no regrets' solutions.

The context

For many of the world's poorest people, rainfall variability is a major impediment to their livelihoods. The inability to manage unpredictable changes in rainfall, and consequently runoff, is a key contributing factor to food insecurity and poverty. Frequently, periods with too much water are followed by periods with too little, and intermittent water scarcity is often a direct consequence of rainfall variability. Under these circumstances, even relatively small volumes of water storage can, by safeguarding domestic supplies and supporting crops and/or livestock during dry periods, significantly increase agricultural and economic productivity and enhance people's well-being. For millions of smallholder farmers, reliable access to water is the difference between sufficient food and hunger.

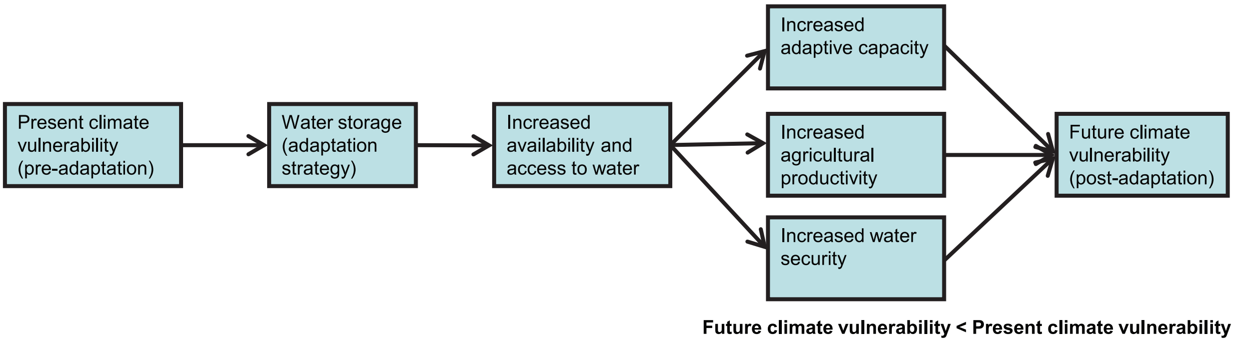
IWMI's position on water storage

In addition to their proven capacity to even out natural variations in rainfall and to support a wide range of livelihoods, small water storage systems may hold the key to adaptation to climate change in many parts of the world. The continuum of water storage options runs from rechargeable groundwater aquifers, natural wetlands and soil moisture to small ponds and tanks and large reservoirs. Each option has a 'niche' in terms of technical feasibility, socioeconomic sustainability, potential impact on health and the environment, biophysical risks and institutional requirements.

Action needed

Rainfall variability is an important factor in development and translates directly into a need for water storage. In Africa, and to a lesser extent Asia, existing variability and insufficient capacity to manage it, lies behind much of the prevailing poverty and food insecurity. These continents are predicted to experience the greatest negative impacts of climate change. By making water available at times when it would not normally be available, water storage can significantly increase agricultural and economic productivity and enhance the well-being of people.

Traditional stone-lined artesian well, Ethiopia (*Photo Credit*: Matthew McCartney, IWMI).



Water storage as an adaptation strategy to reduce climate vulnerability.

The storage type to be used in any given location must be fit for the purpose. Each of the possible options can, under the right circumstances, make important contributions to poverty reduction. However, none is a panacea. All have costs as well as benefits and in any given location the poverty reducing impact of different water storage options varies.

To date, there has been little systematic analysis of alternative storage options and the role that these alternatives may play in poverty reduction and climate change adaptation. With the exception of large dams, in most places past storage development has occurred in a piecemeal fashion, largely through local initiatives and with minimal planning. It is generally characterized by absent or poor data management, insufficient communication with local stakeholders and water resource authorities, and lack of any integrated planning. In some cases, the lack of information and planning has resulted in less than optimal investments. Future population growth, in conjunction with climate change, will increase the importance of water storage in many developing countries. However, as water resources are increasingly utilized and climate variability increases, planning will become even more difficult. Without greater understanding of which types of storage are best utilized under specific agroecological and social conditions and in the absence of much more systematic planning, there is the risk that many water storage investments will fail to deliver the intended benefits. In some cases, they may even worsen the most disagreeable impacts of climate change. Current research aims to better understand water resources and storage under different social and ecological conditions. This will provide insights into potential climate change impacts on water supply and demand; the social and environmental impacts of different storage options; the implications of scaling-up small-scale interventions; and the reasons for success/failure of past storage schemes. Systematic methods for evaluating the suitability and effectiveness of different storage options are being developed to assist planning and facilitate comparison of storage options, individually and within systems.

Source

This Water Issue Brief is based on the following publication:

McCartney, M.; Smakhtin, V. 2010. *Water storage in an era of climate change: addressing the challenge of increasing rainfall variability*. Blue paper. Colombo, Sri Lanka: International Water Management Institute (IWMI). 14p.

Related IWMI publications

Open access (electronic version freely accessible via the internet)

IWMI (International Water Management Institute). 2009. *Water storage and climate change*. Water Figures: quarterly newsletter of the International Water Management Institute (IWMI), 2. 8p.

Johnston, R.; McCartney, M. 2010. *Inventory of water storage types in the Blue Nile and Volta river basins*. Colombo, Sri Lanka: International Water Management Institute. 48p. (IWMI Working Paper 140)

Keller, A.; Sakthivadivel, R.; Seckler, D. 2000. *Water scarcity and the role of storage in development*. Colombo, Sri Lanka: International Water Management Institute. 20p. (IWMI Research Report 39)

Kibret, S.; McCartney, M. P.; Lautze, J.; Jayasinghe, G. 2009. *Malaria transmission in the vicinity of impounded water: evidence from the Koka Reservoir, Ethiopia*. Colombo, Sri Lanka: International Water Management Institute. 47p. (IWMI Research Report 132)

McCartney, M. P.; King, J. 2011. *Use of decision support systems to improve large dam planning and operation in Africa*. Research For Development (R4D) paper. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food. 75 pp.

Narain, P.; Khan, M. A.; Singh, G. 2005. *Potential for water conservation and harvesting against drought in Rajasthan, India*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 31p. (IWMI Working Paper 104 / Drought Series: Paper 7)

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