



# Climate-Informed Water Management for Agriculture

Exposure to climate risk contributes to stagnant agricultural output and the persistence of widespread rural poverty in much of sub-Saharan Africa and parts of South Asia. Improving water management, including irrigation, can reduce the impacts of climate risk, but the opportunities that are viable at a large scale in these regions are limited and provide only partial control, leaving substantial residual risk. Effective climate information services are needed to enhance the benefits of investment in agricultural-water management and reduce the impacts of climate risk.

Exposure to a high degree of climate variability is a characteristic feature of rainfed agriculture in the drylands of sub-Saharan Africa (SSA) and parts of South Asia. A growing body of evidence links unmitigated hydroclimatic variability to poor economic growth, stagnant agricultural development and the persistence of rural poverty and food insecurity in developing countries. Climate change is expected to intensify many of the challenges of dryland agriculture in Africa and South Asia, but in ways that can only be partially anticipated.

Effective water management can lessen the negative consequences of climate variability on agriculture. For example, access to reliable irrigation and effective flood control was crucial for the success of the Green Revolution in much of Asia and Latin America. While critically needed, the opportunities for small-scale water management that seem most viable for agriculture in most of sub-Saharan Africa will provide only partial control. A recent report estimates only three million hectares of additional dam-based irrigation are likely to be profitable in SSA, which would bring the total irrigated area to just 12 million out of 183 million hectares of agricultural land. The report estimates that small-scale water-management strategies may be profitable on another 38.2 million hectares. However, in order for investment to have the greatest impact on rural livelihoods, scarce and varying water supplies must be managed jointly with other factors of production. Every opportunity should be exploited to deal with the residual climate risk that water-control systems alone cannot mitigate.



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The IRI is working with the Bill and Melinda Gates Foundation to develop the strategy and partnership structure for an initiative to enhance the livelihood and security of



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smallholder farmers working under conditions of high climatic risk in SSA and India. By strengthening and integrating climate risk management and climate information services into ongoing and future investment in agricultural water management, the effort aims to:

- (a) Enhance economic returns on investment,
- (b) Reduce vulnerability to climate shocks and
- (c) Foster sustainable intensification leading to improved livelihoods for smallholder farmers.

The process will involve a range of institutions working on agricultural development, water management, climate and communication challenges in the target regions.

The initiative will develop climate information services as a way to contribute to improved management of hydroclimatic risk and more effective management of water for agriculture at the farm, river-basin and national-policy levels. At the level of farming communities, climate information and advisory services will support strategic decisions about land allocation, crop selection and input use at the start of the growing season. The services will also support decisions about the efficient management of scarce water resources during the growing season. At the river basin scale, climate-based hydrologic monitoring, forecasting and decision support will guide operational water management (e.g., scheduling, reservoir management) and provide early warning of hydroclimatic hazards such as flooding. At the scale of national policy, climate-informed planning by relevant governmental agencies (e.g., ministries of agriculture, water and planning; national meteorological services) will contribute to agricultural development resilient to climate variability and change.

The project also aims to strengthen human and institutional capacity and remove obstacles to effective and equitable communication at all three scales. The challenge of communicating climate-related information and guidance to rural communities will be met both by existing institutional channels and through emerging developments in information and communication technology. Together, these initiatives will help smallholder agriculture to better manage climatic risk, and enhance the benefits of investment in improved agricultural water management.

## About the IRI

The IRI works on the development and implementation of strategies to manage climate related risks and opportunities. Building on a multidisciplinary core of expertise, IRI partners with research institutions and local stakeholders to best understand needs, risks and possibilities. The IRI supports sustainable development by bringing the best science to bear on managing climate risks in sectors such as agriculture, food security, water resources, and health. By providing practical advancements that enable better management of climate related risks and opportunities in the present, we are creating solutions that will increase adaptability to long term climate change. IRI is a member of the Earth Institute at Columbia University.