

SERVIR and WATER

Water. Water supports ecosystems, agriculture, human health, and industry. But floodwaters can destroy homes, assets, and farms, sweeping away livelihoods and lives. In the future, growing populations will demand more freshwater, and climate change will exacerbate water scarcity, as the timing and quantity of rainfall and evaporation rates shift. Urban development will continue to place more people at risk of flooding in coastal areas, deltas, and glacial lake outburst flood-prone valleys. Responding to the needs of developing nations, SERVIR's global partners help decision-makers manage their relationship with this essential resource to safeguard development and manage risks.

SERVIR connects space to village by making geospatial information, including Earth observation data from satellites, Geographic Information Systems, and predictive models useful to developing countries. SERVIR is a joint development initiative of NASA and USAID, working in partnership with leading regional organizations around the globe. SERVIR helps those most in need of tools for managing climate risks and land use.

SERVIR global hubs include:

- SERVIR-Eastern and Southern Africa, hosted by the Regional Centre for Mapping of Resources for Development (RCMRD)
- SERVIR-Himalaya, hosted by the International Centre for Integrated Mountain Development (ICIMOD)
- SERVIR-Mekong, hosted by the Asian Disaster Preparedness Center (ADPC). Launched October 2014.

SERVIR places science in the service of society by building the technical capacities of regional organizations with an established track record of working with governments and communities to apply geospatial tools at the local and regional levels. Through

the SERVIR network, experts at SERVIR regional hubs partner with local decision-makers and local and US-based scientists to create new datasets, maps, and decision-support tools that answer critical development questions. SERVIR hubs also provide training to build capacity in local institutions for evidence-based decision-making to meet societal needs.



Managing Water Resources

Water Resources in the Hindu Kush-Himalayan Region

The low-lying deltas downstream of the Hindu Kush-Himalayan region, with their dense population and water-intensive agriculture, are vulnerable to both drought and flooding. In these river systems, snowmelt is a significant source of water and so changes in snow pack and temperature have a major impact on downstream water availability. Strategies for adapting to climate change and meeting growing demand for water require accurate assessments of snow cover and the amount of water stored in the snow. These areas are extremely difficult to access, so remote sensing becomes a critically important tool. SERVIR-Himalaya's historical and near real-time snow cover mapping and analysis enable water resource managers to quantify the volume of water available in the snow pack and more effectively manage the region's water resources.

In addition, the region has a growing number of potentially hazardous glacier lakes. A SERVIR project is exploring the dynamics associated with these lakes,

including the threats of ice avalanches, glacier lake outburst floods, and landslides. The objective is to identify areas at risk and define the threats to agriculture, infrastructure, and villages.

CREST Hydrologic Modeling Tools

SERVIR's Coupled Routing and Excess Storage Tool (CREST) is a sophisticated hydrologic modeling tool, integrating satellite rainfall information with land shape, elevation, soil characteristics, and other variables to calculate actual evaporation, transpiration, soil moisture, and streamflow. The tool is available both in a historical version and in a near-real-time, short-term forecast mode. As an extension to the CREST tool, the Kenya Department of Water Resources requested a CREST Streamflow Viewer and high-resolution maps of areas inundated as a result of flooding. In response, SERVIR's flood-mapping application allows users to visualize the extent of area flooding.

In eastern Africa, CREST covers watersheds with data from 850 stream gauge locations and enables water managers to assess imminent and near-term likelihood of flooding at selected locations. The system sends out daily email updates to users in Kenya and a mobile app is under development. Similar systems are being developed for Rwanda and Namibia to assist with flood preparedness. A related SERVIR project is developing capabilities to monitor water-resource availability in Tanzania, Ethiopia, and Zambia, and provide near-term streamflow forecasts in support of regional water-resource management. This project will also develop a quantitative assessment of how climate

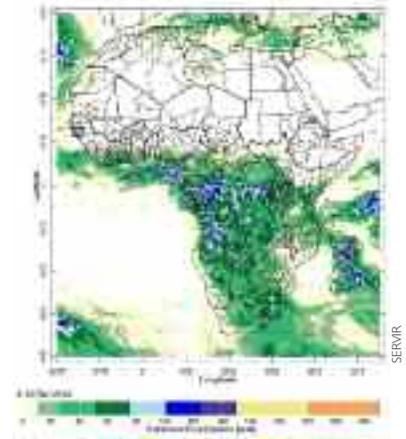


The CREST Streamflow Viewer showing outputs in eastern Africa.

change impacts these nations' water resources.

Predicting Drought

Recurring drought is a particular threat to the Greater Horn of Africa. Estimations of rainfall variations are key to drought early-warning and environmental monitoring. A SERVIR project has produced a continuous 30-year record of rainfall estimates for the region to assess large-scale rainfall patterns. This new and improved satellite-derived rainfall dataset will help local officials better correlate long-term rainfall with crop yields, and how those yields may be evolving as a result of climate change. Local officials can also use this data to predict and mitigate the impact of drought.



SERVIR precipitation estimates help assess the risk of floods and the resulting mosquito-borne illnesses.

Water and Disease

In Africa, mosquito-borne malaria and meningitis epidemics are recurring public health problems closely connected with water. Water provides a breeding ground for mosquitoes, and severe floods can destroy mosquito-control infrastructure. SERVIR tools will help eastern African experts forecast flood risk, assess mosquito-borne disease risk, manage outbreaks, and evaluate their efforts at vector control.

SERVIR strengthens the ability of governments and other development stakeholders to incorporate Earth observations and geospatial technologies to respond to natural disasters, improve food security, safeguard human health, manage water and natural resources. Improved management of natural resources also helps to identify opportunities to improve economic growth while lowering greenhouse gas emissions and building resilience to climate change.

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