



**USAID**  
FROM THE AMERICAN PEOPLE



**RCMRD**

**SERVIR**  Eastern & Southern  
**AFRICA**

# Connecting Space to Village

SERVIR helps countries in Eastern and Southern Africa use information provided by Earth observing satellites and geospatial technologies to manage climate risks and land use.



## THE SERVIR PROGRAM

The SERVIR program 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)

The *SERVIR-Eastern and Southern Africa* hub joined the SERVIR Network in 2008. It is one of three current SERVIR hubs. SERVIR-Eastern and Southern Africa's host institution, the Regional Centre for Mapping of Resources for Development (RCMRD), has 20 Member States in Eastern and Southern Africa with whom it collaborates to promote sustainable development.

### ABOUT RCMRD

The Regional Centre for Mapping of Resources for Development (RCMRD) was established in 1975 under the auspices of the United Nations Economic Commission for Africa (UNECA) and the African Union (AU). It is an Inter-Governmental Organization and as of 2015 has twenty Member States that include Botswana, Burundi, Comoros, Ethiopia, Kenya, Lesotho, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe. RCMRD is based in Nairobi, Kenya.



Gerald Omondi, RCMRD

The Moderate Resolution Imaging Spectro-radiometer (MODIS) receiving station at RCMRD. Data received by the station is used in applications and to advise policy with regard to flood mapping, crop monitoring, fire assessment, water quality assessment, frost mapping as well as prediction of extreme weather situations such as hailstorms.

## **BUILDING TECHNICAL CAPACITY TO USE EARTH OBSERVATION**

RCMRD promotes sustainable development through SERVIR-Eastern and Southern Africa by using Earth observation information from satellites to support problem-solving applications for natural resources management, climate and disaster risk reduction, and low-emissions development. SERVIR combines NASA satellite observations and predictive models, along with other geographic information from satellites and field-based sensors for improved scientific knowledge and environmental decision-making in Africa. SERVIR-Eastern and Southern Africa builds local capacity by working together with African scientists, analysts, and decision-makers to produce, analyze, and use Earth observations and geospatial technology.

## **SERVIR-EASTERN AND SOUTHERN AFRICA IN ACTION**

### ***Land Cover Mapping for Greenhouse Gas Emissions Inventory***

As human activities contribute to greenhouse gases (GHG), it's essential to track changes in forests, ground cover, and land use. Deforestation accounts for 17% of GHG in the atmosphere, so it is important to manage forests and other landscapes to reduce GHG emissions. The United Nations, the US Environmental Protection Agency, and SERVIR are helping nine African nations develop the ability to analyze the impact of land cover change on GHG emissions. SERVIR-Eastern and Southern Africa provides training for national GHG teams and also generates baseline data, using Landsat satellite imagery and land cover maps for



South Africa's Bulelwa Semoli of the Department of Rural Development and Land Reform presents the status of Land Use Land Cover (LULC) and legislation of data during a US Department of the Interior, SERVIR-Eastern and Southern Africa/RCMRD, and United States Geological Survey (USGS) sponsored workshop in Kenya to streamline mapping of Africa's land cover.



Gerald Omondi, RCMRD

This Wireless Sensor Network (WSN) node was installed on a tea farm in Kericho, Kenya by SERVIR-Eastern and Southern Africa and Kenya Meteorological Services. The WSN supports SERVIR's frost-mapping system by supplementing and verifying satellite data.

2000 and 2010. SERVIR is collecting ancillary data from the countries to classify the satellite imagery into land cover maps.

### ***Ecosystem and Biodiversity Mapping***

East Africa is a globally important center for biodiversity. As climate change affects the region's animals and plants, it could also threaten its ecosystems, national parks, and tourism revenues. National Museums of Kenya collaborated with SERVIR-Eastern and Southern Africa to incorporate ground and satellite data to develop maps for selected flora and fauna as a baseline for assessing the potential impact of climate change on their ecosystems. The biodiversity visualization tool maps the region's spatial distribution of plants, fish, reptiles, and birds to produce a web-based biodiversity atlas and integrate future climate projections to help protect ecosystems and manage future land use. Efforts are also underway to expand this project to neighboring countries.

### ***Frost Monitoring and Forecasting***

An early frost can be devastating to farmers. In East Africa, for example, frost has caused millions of dollars in damage to crops such as tea and coffee. With advance warning, farmers can pick early to protect their harvest. Kenya's Ministry of Agriculture asked SERVIR-Eastern and Southern Africa to build their capacity to identify frost-impacted areas and measure ground temperatures to determine, within a 72-hour window, where frost is likely to occur. SERVIR's Frost Monitoring and Forecasting application uses satellite data to assess frost-damaged areas in Africa.

## Flood Forecasting

SERVIR-Eastern and Southern Africa uses satellite rainfall data in near real-time to monitor water flow in streams and rivers in eastern Africa. Using a hydrologic model called CREST (Coupled Routing and Excess Storage), SERVIR provides streamflow information to local hydrologists and supports advanced planning for vulnerable areas. CREST model output allows users to visualize the extent of flooding in a region, enabling SERVIR to send government officials a daily email update with modeled estimates of streamflow. In eastern Africa, CREST covers watersheds with data from 850 stream gauge locations and enables water managers at Kenya's Department of Water Resources to assess imminent and near-term likelihood of flooding at selected locations. At the request of governments in Rwanda and Namibia, SERVIR-Eastern and Southern Africa is expanding CREST support to those countries.



Aimable Twahirwa, IRIN

Heavy floods have hit Rwanda, affecting thousands of families. SERVIR-Eastern and Southern Africa uses the CREST tool to help forecast natural disasters.

## STATE-OF-THE-ART TECHNOLOGY

SERVIR uses data from a suite of Earth-observing satellites, ground-based data, and advanced geospatial information technology in innovative ways to inform development decisions. Custom SERVIR tools integrate information in real-time, and the SERVIR website offers access to a range of environmental information, maps, satellite and sensor data, and other analysis tools. Some applications send alerts

and information directly to users via Internet and mobile technology.



NASA

A visualization of the NASA/JAXA Global Precipitation Measurement (GPM) satellite. SERVIR-Eastern and Southern Africa is phasing GPM data into its CREST model for predicting river discharges.

## A POWERFUL COLLABORATION

SERVIR-Eastern and Southern Africa connects information from space to village by complementing satellite data with ground observations to make analyses more useful. Satellite data shows the "big picture." Ground information and local knowledge are critical to validating satellite-derived information and models, and integrating historic local data. Bringing these data sources together results in improved geospatial models that show what's happening in the region. Through SERVIR partnerships, NASA and other scientists, SERVIR hub staff within regional institutions, and local decision-makers collaborate to develop tools, products, and services that strengthen capacity for evidence-based decision-making, advance low-emission development, and build resilience to climate change.



Gerald Omondi, RCMRD

SERVIR-Eastern and Southern Africa workshop participants view a false color satellite image during a field session to help them understand various land cover types and field methodologies.

*For more information*

RCMRD  
SERVIR-Eastern and Southern Africa  
Kasarani Road  
Box 632 Ruaraka, 00618, Nairobi, Kenya

Tel: +254 20 2680748/ 2680722  
Cell: +254 735 781098  
Email: [servir@rcmr.org](mailto:servir@rcmr.org)  
Website: <https://www.servirglobal.net>

*The Land Cover maps, the Biodiversity mapper and Frost Tools are available for public access online:*  
<https://www.rcmr.org/servir>