WISER
Weather and Climate Information Services for Africa

Case study

WISER partnerships bring new opportunities for national climate services in East Africa

Rwanda case study

ENACTS
ENHANCING NATIONAL CLIMATE SERVICES

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The Enhancing National Climate Services (ENACTS) project focuses on creating reliable quality climate information suitable for national and local decision making. The ENACTS approach blends rigorously evaluated local observations from the entire national meteorological observing system managed by the National Meteorological Agency with the best available global products, such as satellite data and reanalysis, to produce historical and monitoring climate data with national coverage and local relevance.

Initiated by the International Research Institute for Climate and Society (IRI) and implemented in partnership with National Meteorological Agencies and ICPAC, ENACTS is already being piloted in eight African countries, including Rwanda. Originally supported from USAID's Presidents Malaria Initiative and the African Climate Policy Center and now with technical support from the DfID funded WISER-ENACTS and SCIPEA projects, this publically available service is revolutionizing national climate services in Rwanda – connecting those that supply climate information to those that need it. For example, ENACTS has now become the cornerstone of the Rwanda Climate Services for Agriculture initiative. This four-year project (2016-2019) builds on many years of applied research on climate services for agriculture by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and its partners in Africa and beyond, and employs the ENACTS approach.

Rwanda Meteorology Agency (Meteo Rwanda) is using the ENACTS approach to overcome data challenges

While climate services and other climate-informed interventions can benefit a range of climate sensitive sectors, efforts to provide routinely updated quality information face many challenges. At the core of any effective climate services are data. Furthermore, ground observational climate records are essential to produce quality data and reliable climate analysis, short-term forecasts, and long-term projections.

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However, major gaps exist in Rwanda's historic observations, especially during the most devastating period in the country's history. In the years following the 1994 Rwanda Genocide, the number of operating weather stations dropped from over 100 to under 10, and did not truly begin to recover until 2010 (Figure 1).

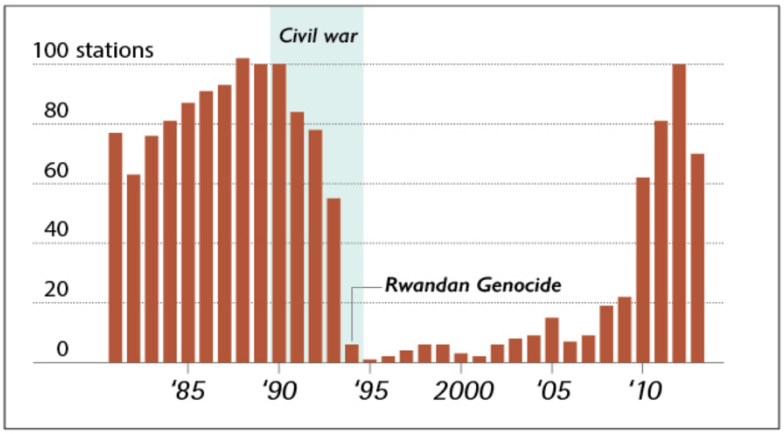

Figure 1: Number of weather stations operating in Rwanda by year. Courtesy of IRI

Through the ENACTS initiative, Meteo Rwanda has been able to quality control its observational data and merge the results with global climate proxies including satellite and reanalysis data (using years of large amounts of data to calibrate global proxies for years where data is sparse). The result is a 30+ year historical database of rainfall and temperature (minimum and maximum) that is available for every 10 days at 4-5km spatial resolution. In addition, monitoring products are also produced routinely within three days of when the global rainfall satellite data and locally available station data become available. All the information is disseminated through readily accessible web-based "Maprooms" hosted on the website of Meteo Rwanda that are built using the IRI's powerful Data Library software.

However, addressing the issues of data availability and access are just the first steps. Even after the information is made available and accessible to users, it is critical to demonstrate the quality of this information and tailor it for specific user needs. More specifically, farmers may be most concerned with information most relevant to their agricultural activities, such as the likelihood of a drought; whereas, health decision-makers may need information on observed or forecasted rainfall and temperature anomalies which favor certain disease transmission such as malaria.

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Better data reveals higher forecast skill

The flexibility of the information system used to manage the ENACTS data mean that products can be readily used to serve multiple needs. For example, a priority activity for climate service providers is to provide early and skillful seasonal rainfall forecasts to a wide variety of stakeholder communities including small-holder farmers. Skill in seasonal forecasts is strongly related to its potential utility and economic value. A skillful climate forecast reduces uncertainty by minimizing the spread of possible outcomes for the upcoming season relative to the climatological distribution; it also conveys shifts in the central tendency of climatic outcomes. This information allows decision-makers, including farmers, to better adapt management decisions to upcoming weather conditions.[1]

If forecast skill is low, then the value of the forecasts to users is also low. Low skill may be derived from two distinct issues:

a) poor quality historical climate information against which to test the quality of the forecast, and

b) poor understanding and/or inherent low predictability in the climate system

Under the WISER initiative, the former issue is being addressed through ENACTS while the latter is being addressed through the SCIPEA project which seeks to strengthen national and regional resources and tools for seasonal forecasts.

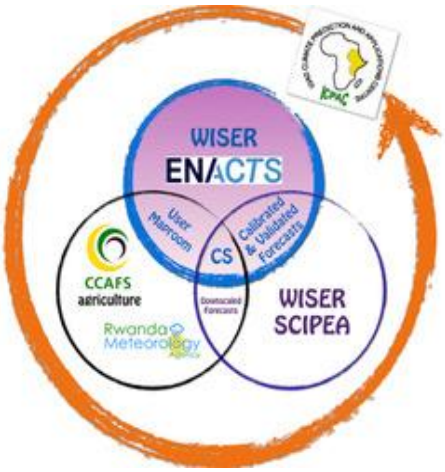

Figure 2: WISER partnerships and CCAFS supporting Meteo Rwanda and Climate Services (CS) delivery. Courtesy of IRI.

The potential strength of an integrated approach which brings together better data (ENACTS), better forecasts (SCIPEA) and direct user engagement (CCAFS) along

[1] Meza FJ, Hansen JW, Osgood D, 2008. Economic value of seasonal climate forecasts for agriculture: review of ex ante assessments and recommendations for future research. Journal of Applied Meteorology and Climatology 47: 1269-1286.

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with technical support from the regional climate center, ICPAC, is illustrated in Figure 2.

A recent capacity building workshop and extended training at the IRI, supported by WISER (SCIPEA and ENACTS) and CCAFS, brought together meteorologists from Ethiopia, Uganda, Rwanda, and ICPAC to explore predictability of the seasonal climate, climate services, and product development in Eastern Africa.

Analysis of the Rwanda ENACTS rainfall datasets revealed that skill in seasonal forecasts is significantly undermined when using readily available global rainfall products when compared to nationally produced ENACTS (Figure 3).

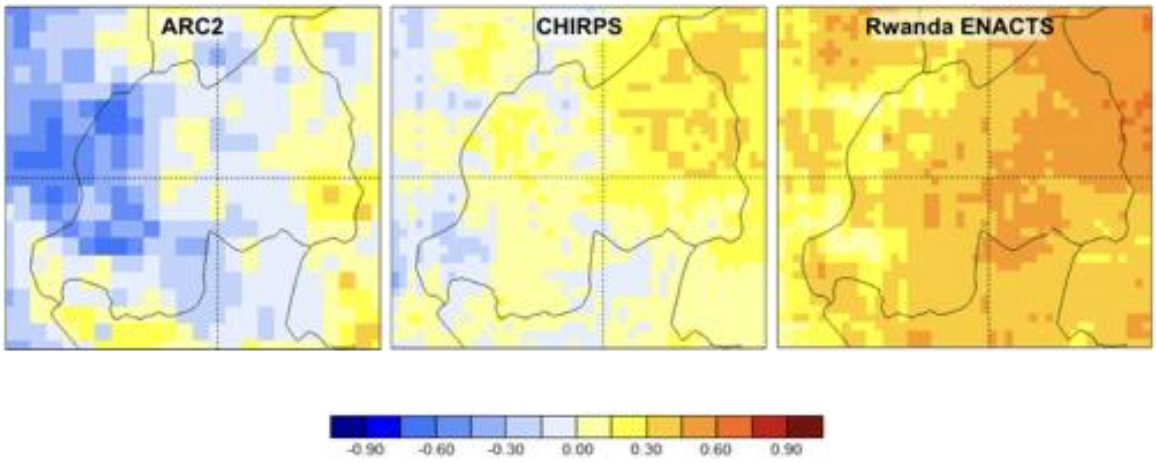

Figure 3: Nationally-produced historical ENACTS rainfall data reveals greater skill in seasonal climate forecasts than comparable global products. Skill of seasonal rainfall forecasts for September-December, made in August, based on a global climate model (CFS v.2), evaluated against a national data set (ENACTS) and two global data sets (CHIRPS, ARC2). Higher correlation (red and orange) indicates more skillful forecasts. Courtesy of IRI & V. Floribert.

When satellite products, with few local observations (ARC2 and CHIRPS), are used to estimate actual rainfall the seasonal forecasts appear to have little skill. Based on these results, a user may wonder whether it is worth using the seasonal forecasts at all. However, when ENACTS data is used, it is clear that seasonal forecasts can be skillful in Rwanda, and could potentially provide useful information to local decision-makers.

What's next?

Despite the devastating impact of the genocide on Rwanda's meteorological observations, new ENACTS products can start to fill the gap and form an alternative for Meteo Rwanda's climate services.

ENACTS' comparative advantage comes from the quality of the national climate products along with national ownership and associated capacity building. The next steps will entail looking at the improvement of quality of services and the engagement of users.

Vuguziga Floribert (for Climate Services at Meteo Rwanda). Courtesy of V. Floribert

After the workshop, Vuguziga Floribert from Meteo Rwanda stated that "before ENACTS, we thought our data gap would mean we could not provide a quality climate service. Now all that has changed."

These preliminary results demonstrate the power of partnership. High-definition historical ENACTS climate data produced by National Meteorological Agencies, along with increased access and capacity to use global forecast model outputs resulting from SCIPEA, can create skillful climate products that may serve user needs as those proposed by CCAFS. In that same process, the ENACTS approach strengthens in-country capacity, targeted decision-making and policy analysis.[2] It also opens the door for national researchers to investigate their climate and societal connections with much greater confidence that significant results will emerge.

For questions or concerns in regards to this article, please contact Aisha Owusu at aowusu@iri.columbia.edu

[2] Dinku T, Cousin R, del Corral J, Ceccato P, Thomson M, Faniriantsoa R, Khomyakov I, Vadillo A, 2016. THE ENACTS APPROACH: Transforming climate services in Africa one country at a time. World Policy Journal.

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