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Climate Change Analysis Strengthens Early Warning of Food Insecurity

FEWS NET

A farmer in Ethiopia, expecting poor wheat yields, shows the few grains produced by a single shaft. As climate change alters rainfall patterns, scientists are developing more precise tools for forecasting the impact of weather on crop production.

As populations grow and agricultural seasons shift, insights into historical climate patterns are helping forecast future conditions with increasing accuracy and geographical precision.

“It’s one thing to look back historically and say that East Africa is getting drier, but what’s really valuable is using three decades of data to help anticipate the upcoming season in a specific area,” says Chris Funk, a climate expert with the U.S. Geological Survey’s (USGS’s) Earth Resources Observation and Science Center, who is based at the University of California Santa Barbara. “In some cases, we are able to make some quite skillful predictions.”

Funk is part of a group of U.S. Government and university geographers and climatologists collaborating across agencies to support the U.S. Agency for International Development’s **Famine Early Warning Systems Network** (FEWS NET). A 30-year-old initiative created after devastating famines in East and West Africa, FEWS NET provides early warning and analysis of acute food insecurity in 36 countries. In addition to USAID and the USGS, FEWS NET’s other U.S. Government partners include the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Agriculture (USDA).

Along with ongoing monitoring and analytical inputs into FEWS NET’s monthly food security reporting, FEWS NET partners also produce new, in-depth research. Recently, Funk and others **connected historical trends** in sea surface temperatures along the equator between Indonesia and Hawaii to forecast prospects for rainy seasons in southern Ethiopia.

“Looking at variations from year to year and changes across a timescale of decades, the temperature variations seem to have a lot of control over southeastern Ethiopia,” Funk says.

That geographical precision is important because the effects of climate change can vary. For example, while parts of the Greater Horn of Africa are experiencing drier seasons with less rainfall, other areas are getting more rainfall, or the same amount of rainfall, but with different timing, duration and intensity.

Insight into this variability is critical to helping people adapt their livelihoods – for example, when and where to plant crops – and empowering governments to make climate-smart decisions on agricultural investments, resource management, disaster preparedness and other policies.

Funk, Nairobi-based FEWS NET scientist Gideon Galu and others **mapped rainfall and cropping data in Kenya** to identify which places are climatically at-risk and which are secure. The research indicated that while the population in Central and

Eastern Kenya is increasing, the area is becoming drier, inhibiting agricultural development. Meanwhile, western Kenya is proving to have stable seasons, making it more promising for large-scale investment to increase national agricultural productivity.

A key data source in this research is the **Climate Hazard Group Infrared Precipitation with Stations** data archive, known as CHIRPS, which contains 34 years of rainfall information. The data set is publicly available on the USGS/FEWS NET **website**. USGS and NASA scientists are using the CHIRPS data to develop hydrologic models that look at how changes in air temperatures and rainfall affect stream flow and soil moisture.

“Increasingly, we are translating abstract variables into things people care about. For example, is there enough water in the soil to support crops? Or, is there enough water in streams to support irrigation or hydropower?” Funk says. “This is information directly relevant to high-level decision-making.”