UC SANTA BARBARA

THE Current

January 8, 2019
Sonia Fernandez

Climate Early Warning

The images shook the world: Ethiopian children dying of starvation as their emaciated parents looked on, victims of the food shortage and hunger crisis that struck the drought- and conflict-riddled nation from 1983 to 1985. Those photographs sparked unprecedented fundraising and global relief efforts, but by the time food aid arrived, approximately one million people had already died.

For U.S. Geological Survey (USGS) and UC Santa Barbara geographer Chris Funk, who was a teenager at the time, that period was one he would never forget.

“For me the Ethiopia crisis was a big deal,” he said. “And so when it came up in graduate school that I could help prevent that kind of thing by working with partners at the USGS, I thought that was pretty cool — using observations from satellites to help prevent famine.”

Funk, along with colleagues Greg Husak and Joel Michaelsen, and other collaborators at UC Santa Barbara met that challenge 20 years later when they rapidly identified another extreme drought — the “worst drought in fifty years”— in Ethiopia. They did so by analyzing over a decade’s worth of climate and vegetation data as part of their work for the U.S. Agency for International Development’s (USAID) Famine Early Warning System Network (FEWS NET). As a result of FEWS NET’s efforts, food aid was mobilized ahead of time, which helped save countless lives.

“I wouldn’t say there were no deaths but the level of mortality in Ethiopia associated with this recent drought was much lower,” Funk said. “There was poverty, there was

hunger, but it was nothing like a million people dying in 1984."

With the effects of climate change only beginning to take their toll, coupled with rapidly increasing global population, the need to predict outbreaks of food insecurity has become more necessary, even imperative.

"Food insecurity is reaching epidemic proportions," Funk said. "Between 2015 and 2019 the number of people who are severely food insecure is expected to go from 45 million to about 83 million, which is approximately a 75-percent increase. So now something like one out of every hundred people face extreme levels of hunger, every day."

To combat this rising tide of food insecurity, Funk, Husak, Michaelsen and colleagues have launched the UCSB Climate Hazards Center (CHC), which sits within the geography department. The center, primarily funded by the USGS/USAID and NASA, connects a team of top notch scientists and programmers at UC Santa Barbara with an international team of field scientists in Africa and Central America. It's a move, they say, that will bring more permanence to their work to get ahead of famine, while also expanding their efforts to include other climate-related monitoring and disaster-mitigating activities. Currently, the center team combines advanced researchers, scientific programmers and editors, fields scientists and graduate students.

"The center will help bring stability by creating links with additional researchers and faculty, said Husak, "by helping identify new funding sources, allowing for more formal relationships with non-governmental organizations and partner organizations and raising the profile of the research being conducted by the team."

The new center is an evolution of the UCSB Climate Hazards Group, formed by the researchers in 2003 to support FEWS NET's acute food insecurity detection efforts. Born of the enthusiasm and expertise of an international group of scientists and analysts, both on campus and on the ground in places like East Africa and Latin America, the group's drought early warning efforts, would, in turn, guide USAID's actions to assist developing countries in crises.

The Climate Hazards Center features a broader scope that also encompasses different facets of the human-climate relationship by looking at issues related to demography, livelihoods, vulnerability and adaptation.

“We’re trying to help identify and target relief to the people who need it most,” Funk said.

Remote Monitoring + Onsite Action

The worst time to find out about a food crisis is when you’re already in it. However, predicting such a crisis isn’t as straightforward as it may seem. Drought can cause acute food insecurity, but so can flood, and both can result in widespread crop failures and set off a cascade of other effects such as infectious disease, malnutrition and poor child development, as well as social and economic problems.

To determine whether an acute food shortage is in the making, the CHC team studies climate and satellite data for factors — including land surface temperatures, rainfall and crop conditions — that indicate emerging climate hazards. Once the red flag is raised, key actors in the United States and in the affected regions are provided with guidance, helping to target resources to meet the potential crises.

“The field scientists are really at the core of our team because they take the work that is done at UCSB and share it with the key stakeholders in Africa and Central America,” Husak said. “Through the years they have developed a network of partners and decision-makers who take our work and translate it into action.”

The same climate monitoring activity, data analysis, relationship-building and proactive stance established by the Climate Hazards Group for food insecurity will be employed by the new Climate Hazards Center to cover other climate change-related effects and studies as well, including fire, drought early warning, ecological management and climate adaptation. The center will expand to include expertise from other parts of the UC Santa Barbara campus, including the Bren School of Environmental Science & Management and the departments of earth science, political science, economics and anthropology.

“Our understanding of the interaction of climate change and climate extremes has really improved, too,” Funk said. New data streams, better tools and continuous training contribute also to enhanced models. “We used to focus much more on climate trends; now we focus on identifying, understanding and predicting the extremes that create the trends.”

The center, say the researchers, will also provide the environment for up-and-coming climate scientists to connect with current and emerging climate problems

and explore real-world solutions. Given the state of climate change, they argue, we're going to need all the help we can get.

"My opinion is that the climate is changing and the tone from the recent Intergovernmental Panel on Climate Change report is that it's worse than we'd hoped," Husak said of the 2018 IPCC report calling for "transformative and unprecedented" measures to put the brakes on global warming lest irreversible impacts take place. Other recent reports indicate that the ocean is warming faster than expected, which, according to Funk, may lead to more drought conditions for us here in California, and stronger El Niño impacts globally.

"So what that's doing is creating sequences of droughts in different places," Funk said, "which is not good. But we can also consider these climate extremes as opportunities for monitoring and prediction. The goal of the center will be to keep developing and applying cutting edge climate science, so that we can meet a dangerous future with more effective observations and forecast systems."

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.