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Sri Lankan water history informs global climate change study

Modern farming practice of rainwater storage in ancient tanks lauded as best practice adaptation strategy

BONN, GERMANY (14 JUNE 2013)—Whether it's bracing for drought in Sri Lanka with a return to ancient water storage systems or swapping coffee for cocoa in Central America, findings from a new report from the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) chart a path for farmers to adapt to climate shifts despite uncertainties about what growing conditions will look like decades from now.

As this week's UN climate talks in Bonn continue to sideline a formal deal on agriculture, the study, *Addressing uncertainty in adaptation planning for agriculture*, which was published recently in the [Proceedings of the National Academies of Sciences \(PNAS\)](#), finds that the cloudy aspects of climate forecasts are no excuse for a paralysis in agriculture adaptation policies.

"Climate projections will always have a degree of uncertainty, but we need to stop using uncertainty as a rationale for inaction," said Sonja Vermeulen, head of research at CCAFS and the lead author of the study. "Even when our knowledge is incomplete, we often have robust grounds for choosing best adaptation actions and pathways, by building pragmatically on current capacities in agriculture and environmental management, and using projections to add detail and to test promising options against a range of scenarios."

The CCAFS analysis shows how decision-makers can sift through the different gradients of scientific uncertainty to understand where there is, in fact, a general degree of consensus and then move to take action. Moreover, it encourages a broader approach to agriculture adaptation that looks beyond climate models to consider the socioeconomic conditions on the ground. These conditions, such as a particular farmer's or community's capacity to make the necessary farming changes, will determine whether a particular adaptation strategy is likely to succeed.

"Getting farmers, communities, governments, donors and other stakeholders to embrace various adaptation strategies can end up being equally or more important than seeking higher levels of scientific certainty from a climate model," said Andy Challinor, a professor at the Institute for Climate and Atmosphere Science, School of Earth and Environment at the University of Leeds, who co-leads research on climate adaptation at CCAFS and was also an author of the study. "There is no question that climate science is constantly improving," he added. "But scientists also need to understand the broader processes involved in agriculture adaptation and consider how we can better communicate what we do know in ways that are relevant to a diverse audience."

Research carried out by Colombo-based International Water Management Institute (IWMI) a CGIAR partner with CCAFS, was also a key contributor to the study which uses examples from the program's recent work in the developing world to illustrate how Sri Lanka among other countries has pursued climate change adaptation strategies that will help them prepare for shifts in growing conditions in the near-term and long-term.

Some of the strategies involve relatively straightforward efforts to accommodate changes in the near-term that will present growing conditions that are not significantly different from what farmers have experienced in the past. For example, faced with climate models that predict above normal precipitation and others that predict it will be below normal, the Sri Lankan government is working with farmers to revisit traditional approaches to water storage to provide insurance against what, at the very least, will be climate variability.

The authors also explore how, in some parts of the world, adaptation planning must consider long-term changes that exceed historical experience and require "wholesale reconfigurations of livelihoods, diets, and the geography of farming and food systems." For example, while various climate models offer different assessments of changes expected in Central America, they agree that over the long-term, higher temperatures are likely to render *Arabica* coffee production unsuitable at lower altitudes. "No regrets" strategies could involve shifting some production to higher altitudes and, at lower altitudes, switching to a different, but similarly lucrative crop, like cocoa.

Near-term Adaptation Planning in Sri Lanka: Ancient Water Storage Heads Off Future Threats

In Sri Lanka, where agriculture accounts for almost one-third of employment and one-eighth of the gross domestic product (GDP), the sector faces uncertainty in the near-term as projections for precipitation and temperature vary dramatically. Instead of delaying a decision until more certainty emerges, government planners are looking at the frequency of historical exposure to climate hazards (droughts, floods, cyclones, et. al.) and identifying the need for improved water management as an agricultural adaptation strategy that would be beneficial regardless of how climate changes shaped the precipitation in the future. IWMI contributes its global expertise in water management to help Sri Lanka tackle these challenges.

The government then worked with smallholder farmers and others on a range of adaptive measures that have addressed agriculture water usage for centuries. Ancient Sri Lankan kingdoms used large above-ground tanks to collect and store rainwater for use in drier times; farmers are looking into ways of implementing this solution once again along with recycling their household wastewater and using groundwater sustainably.

"We have a rich heritage of water storage in Sri Lanka," said Nishadi Eriyagama, a water resources engineer at IWMI who took part in the study. "But according to recent research, half of all the 18,000 tanks in the dry zone are abandoned or in need of repair. So there is both a huge challenge and a great opportunity to revive these systems to help us adapt to climate change."

"In Sri Lanka, adapting without regrets started with knowing farmer capabilities and vulnerabilities," noted Challinor. "Despite limited resources, the government's adaptation plan is giving farmers a head start because of its practical approach. Better water capture and management on the farms is translating to better preparation for more extreme weather conditions; better food security for the nation is the result."

Other Nations Step Forward as Vulnerabilities Take Shape

As short-term and long-range agriculture forecasts reveal disturbing trends, especially in developing countries, many decision-makers acknowledge the critical importance of moving forward with climate adaptation.

“Some farmers and countries are going to need to make big transitions in what food they produce,” concluded Vermeulen. “Science is now reaching a point where it will be able to provide advice on when—not just whether—major climatic shifts relevant to agriculture will happen. Helping governments and farmers plan ahead will make all the difference in avoiding the food insecurity and suffering that climate change threatens.”

The **International Water Management Institute (IWMI)** is a non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries. It is headquartered in Colombo, Sri Lanka, with regional offices across Asia and Africa. IWMI works in partnership with governments, civil society and the private sector to develop scalable agricultural water management solutions that have a real impact on poverty reduction, food security and ecosystem health. www.iwmi.org organizations, including national and regional research institutes, civil society organizations, academia and the private sector (www.cgiar.org).

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). CCAFS brings together the world’s best researchers in agricultural science, development research, climate science and earth system science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security. For more information, visit www.ccafs.cgiar.org.

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