CGIAR

RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**

CCAFS

Climate analogues

Finding tomorrow's climate adaptation solutions today.

It is no great secret that climate change presents a massive challenge to agriculture. While some regions will develop a climate that favours agriculture, most will not. Even in places where conditions improve, many resource-poor smallholders will be hard pressed to take advantage of the additional production potential while, in areas where conditions deteriorate, farmers will have to adapt to their new circumstances as quickly as possible. This will be particularly difficult for smallholders who completely depend on agriculture for their food and livelihoods.

Strategies and technologies for adapting to climate change in particular locations should ideally be grounded in knowledge of the future climatic conditions in those locations. Estimates hold that 70% of future climates already exist somewhere in the world. That is where the analogues approach comes in.

The CCAFS climate analogues tool

Using one or more global climate models, the analogues tool developed by CCAFS takes climate and rainfall predictions for a particular site and searches for places with similar conditions at present. Armed with the knowledge of what they may face in future, farmers, researchers and policy makers can determine their adaptation options based on real – as opposed to crystal ball-gazing – models. The tool can also track historical data to learn how communities have adapted – or have failed to adapt – to climate change over time. Importantly, it helps capture the real world capacity of farmers to adapt, which is too often not taken into account in catastrophic climate models. Users of the tool – which is available online at analogues.ciat.cgiar.org/climate – can include variables such as crops, soils and socio-economic indicators in their searches.

Comparing present-day farming systems to their future analogues can facilitate the exchange of knowledge between farmers in different locations who share common climate interests and allows adaptation strategies and technologies to be tested and validated. CCAFS is disseminating the analogues tool widely and training regional, national and local partners to use it, in the hope of expanding its use beyond its project sites. So far, CCAFS has trained nearly 200 researchers from East and West Africa, Europe and Central America.

Practical applications

The analogues tool can be used to support climate change adaptation in at least two important ways.
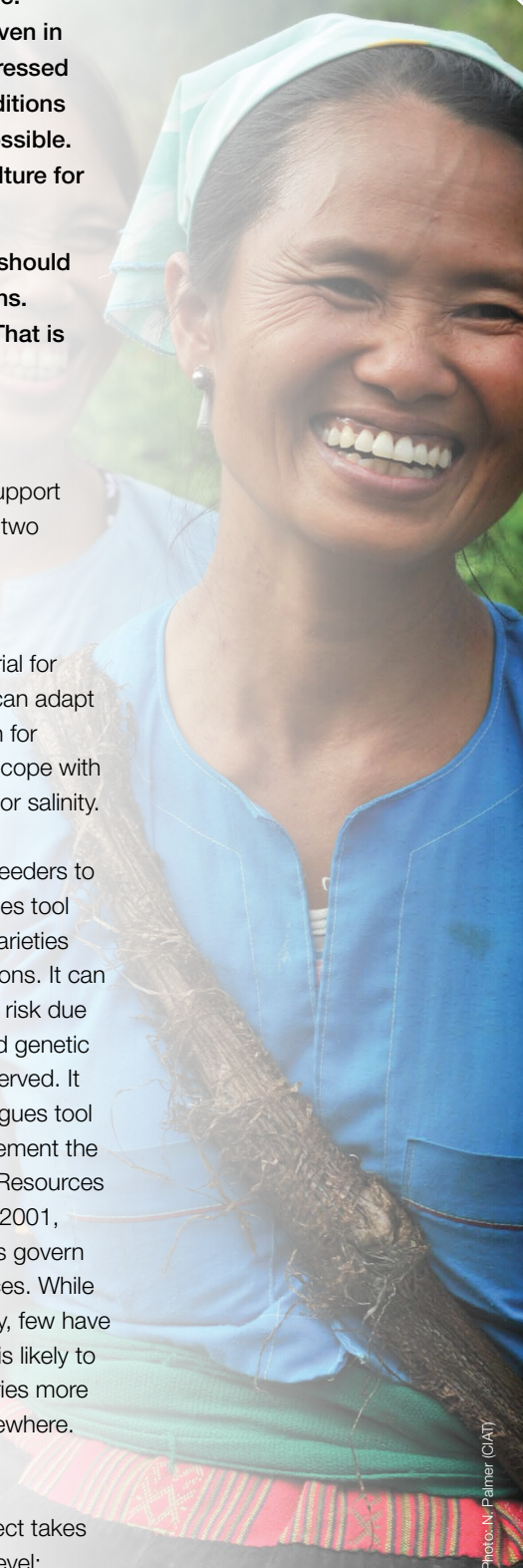
Genetic resources exchange

Crop diversity provides the raw material for breeding new varieties of crops that can adapt to climate change. It is the foundation for resilient production systems that can cope with climate-caused stresses like drought or salinity.

As pressure builds for farmers and breeders to adapt to climate change, the analogues tool can help identify the crop traits and varieties that will be needed in particular locations. It can identify where crop diversity will be at risk due to climate change so that endangered genetic resources can be collected and conserved. It has even been posited that the analogues tool might motivate policy makers to implement the International Treaty on Plant Genetic Resources for Food and Agriculture. Adopted in 2001, the Treaty's most important provisions govern the exchange of crop genetic resources. While most countries have ratified the Treaty, few have taken implementation seriously. That is likely to change as climate shifts make countries more dependent on crop diversity from elsewhere.

Farms of the Future

The CCAFS Farms of the Future project takes the analogues approach to the next level:

What the analogues tool can tell us

▸ Climate models predict a 1°C rise in average temperatures by 2030 during the maize-growing season near the city of Durban, South Africa; this could result in a 20% drop in yield. The analogues tool suggests looking to northern Argentina and Uruguay, where maize farmers are enjoying good yields under average temperatures that are 3°C higher than those around Durban.

▸ The 2030 climate in a soybean-growing area near Shanghai, China will be similar to current climates in soybean-growing zones in the USA and South America. Farmers in Shanghai can learn from these analogous climates as their own climate shifts.

▸ An analogue of present day Los Angeles shows that the southeastern USA, France, northern Germany and the Netherlands might all experience southern California's mild winter climate by 2030, with implications for the agriculture in these regions.

"Travel through space and time with the analogue tool to find your adaptation future.

putting farmers directly in touch with their agricultural futures by taking them there. Through visits to farms in other parts of the country – and sometimes other parts of the world – farmers are introduced to the climate challenges they are likely to face over time. The visits allow them to share strategies and practices with farmers who are facing those challenges today. Nor are the visits one-sided: the host farmers learn about the visitors' adaptation strategies as well as sharing their own.

The project is also studying the social, cultural and gender-specific barriers to adaptive change. Women and other marginalized groups will experience particular challenges, due to their tendency to be more vulnerable to the effects of climate change. Farm visits offer researchers an opportunity to understand and act on these challenges since the creation of climate change adaptation networks can tap into women's institutions, raise the profile of female innovators and empower women producers with new strategies to secure food for their families.

In 2012, researchers used the analogues tool to track locations whose climate was similar to the climate projected for 2030 in Yamba, Tanzania. A small group of Yamba farmers travelled to several analogue locations to see firsthand how farmers were dealing with the climate conditions that lie in Yamba's future. The Yamba farmers learned about soil and water conservation, tree and coffee nurseries, beekeeping and other practices that they could take back home. They were given video cameras so they could document and share these practices with their families and friends in Yamba. Now, Yamba's farmers are equipped to manage their own future climate situations. The Tanzania visits were the first in a series of pilots; exchanges have also taken place in Ghana and Nepal with additional visits planned for other countries in East and West Africa and South Asia. The research team returned to Nepal after a year and found that the community that took part in the exchange had adopted some new practices but not others, providing useful insights for future exchanges.

While Farms of the Future directly benefits participating farmers and their communities, it is too expensive and unwieldy to use as a development tool on a large scale. It does, however, yield important insights into the types of barriers and constraints that need to be addressed through collaborative partnerships with established actors on the ground. To achieve large-scale impact, these insights need to feed into broader research and development processes.

To find out more about the Climate Analogue Tool, please visit http://ccafs.cgiar.org/climate-analogues

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