Warming May Cause Crop Failures, Food Shortages by 2030

Mason Inman
for National Geographic News
January 31, 2008

Impoverished farmers in South Asia and southern Africa could face growing food shortages due to climate change within just 20 years, a new study says.

Increasing levels of greenhouse gases, including carbon dioxide, are heating up the planet, with droughts and shifting rainfall patterns predicted for many parts of the world.

"The majority of the world's one billion poor depend on agriculture for their livelihoods," said the lead author of the new study, David Lobell of Stanford University.

"Unfortunately, agriculture is also the human enterprise most vulnerable to changes in climate."

Climate change will affect some places more than others, so Lobell and colleagues focused on 12 regions where most of the world's impoverished live and the crops that the poor tend to grow and eat in those places.

They identified two hot spots—South Asia and southern Africa—where higher temperatures and drops in rainfall could cut yields of the main crops people grow there.

"We were surprised by how much, and how soon, these regions could suffer if we don't adapt," said study co-author Marshall Burke, also at Stanford.

Corn, Wheat at Risk

The researchers used computer models to predict changes in temperature and rainfall as the planet warms.

Most of the 12 regions were predicted to warm up about 1.8 degrees Fahrenheit (1 degree Celsius) by 2030—about the same amount of warming that Earth as a whole experienced over the 20th century.

"To identify which crops in which regions are most under threat by 2030, we combined projections of climate change with data on what poor people eat, as well as past relationships between crop harvests and climate variability," Lobell said.

The predictions from the various climate models often didn't agree on rainfall changes, he noted. But the overall analysis did suggest that southern Africa and South Asia were two spots where hotter temperatures and lack of water are most likely to stress crops.

"By looking systematically across regions and at a wide range of crops of importance to the poor, we hope to provide a way to prioritize investments in adaptation," Lobell said.

In southern Africa, corn (also known as maize) is a major crop, but it will suffer especially, the study suggests.

Lobell and colleagues predict about a 30 percent drop in corn yields there, along with a 15 percent drop in wheat yields, and smaller drops for soybeans and sugarcane.

They predict a small increase in rice yields for the southern Africa, and little change for sorghum or cassava.

In South Asia, on the other hand, almost every major crop would suffer a decline of about 5 to 10 percent, with only soybeans experiencing a slight gain in yields, the study predicts.

Changing which crops are cultivated in these areas could help populations cope with climate change, the authors argue.

They report their findings in this week's issue of the journal *Science*.

A Global Impact

Taking a global view of crop yields could be important because the markets are globalized, and worldwide decreases in yields could drive up food costs, argues a commentary also published in *Science.*

Molly Brown of the NASA Goddard Space Flight Center in Greenbelt, Maryland, and Christopher Funk of the University of California, Santa Barbara wrote the commentary.

By making fundamental changes, these regions could cope much better with today's problems and those to come with climate change, they say.

"Transform these agricultural systems through improved seed, fertilizer, land use, and governance, and food security may be attained by all," Brown and Funk write.

Tom Sinclair, an agronomist at the University of Florida in Gainesville who was not involved in the study, said, "The big unknown is water."

Climate models, including those used in the new study, don't agree on how rainfall will change in the coming decades, Sinclair says.

In addition, he says, the new study's approach of looking at average rainfall and temperatures misses what's most important for plants.

"What gets them is extremes [of] hot or cold," Sinclair said. "Or if you have episodes where the rainfall is spread apart, where the crops are more vulnerable to drought, then that's a real problem."

Like Brown and Funk, Sinclair also calls for more spending on improved crops, especially breeding

drought-resistant produce.

"If I had a stack of money, that's where I'd put it," Sinclair says.