



## Climate and agriculture in East Africa: The future is mixed



*Climate change will have significant impacts on agriculture, particularly in East Africa where there is such variation in topography and climate. Results of a recent simulation study suggest that crop yield reductions may be expected over 50% to 70% of the area simulated. At the same time, highland areas in parts of the region may see increases in yield potential.*

The work of Phil Thornton and co-workers, outlined here, is part of a larger research project called the Climate-Land Interaction Project (CLIP).

The linkages between land use/land cover and climate change are being examined through the modeling of agricultural systems, land-use driving forces and patterns, the physical properties of land cover, and the regional climate. CLIP is quantifying the two-way interactions between land use and regional climate systems at multiple scales in East Africa, a region that is undergoing rapid land-use change.

In the study, the authors ran two crop models, one for main-season maize and one for secondary-season *Phaseolus* beans, with daily weather data that are characteristic of future climatic conditions in the region, as represented by a combination of two climate models and two contrasting greenhouse-gas emission scenarios. Details of assumptions, methods and data used are in the study mentioned below.

In comparing current and future (2050) production, the authors found that if all areas where maize and secondary-season beans could potentially be grown were indeed cropped, then "regional production" would decline by 1-3% for the lower emission scenario, and by 11-15% for the higher-emission scenario, depending on the climate model used. Maize yields are projected to be reduced (often by 20% or more) for large areas in the north-west of the study region (northern Uganda, southern Sudan) and for the more semi-arid areas of Kenya and Tanzania where maize cropping is possible. In contrast, maize yields are projected to increase in some of the highland areas: in the southern Ethiopian highlands, the central and western highlands of Kenya, and the Great Lakes Region. Projected yield losses in secondary season beans are rather more widespread, with many parts experiencing yield losses (sometimes of up to 350 kg per ha and more). Other areas, such as the western highlands of Kenya, the Great Lakes region, and northern Mozambique, are projected to see substantial increases in bean yields. The authors note a large amount of variability in crop yield responses, as might be expected from such simulations. They also point out that there are likely to be changes in the type, distribution and severity of crop diseases as a result of the changing climate.

Their results suggest that there may be a future need for various adaptation options: more drought-tolerant maize varieties, for example, coupled with management practices that can make the most of available rainfall such as water harvesting. For bean production, a shift to higher elevations may be appropriate in some situations.

Warning that these results should be interpreted with a lot of caution, as there are various sources of uncertainty associated with them, the authors emphasise the utility of this kind of analysis as a first step in identifying possible "hotspots" in East Africa where cropping adaptations may need to be implemented. Coping with climate variability is certainly not a new problem for African farmers, but existing coping mechanisms may not be up to the challenges that are likely to be faced in the future.

The full report on "*Crop Yield Response to Climate Change in East Africa: Comparing Highlands and Lowlands*" can be accessed at:

[http://www.ihdp.unu.edu/article/IHDP\\_Update\\_2.2008\\_-\\_Mountainous\\_Regions:\\_Laboratories?menu=9](http://www.ihdp.unu.edu/article/IHDP_Update_2.2008_-_Mountainous_Regions:_Laboratories?menu=9)

Or by contacting [p.thornton@cgiar.org](mailto:p.thornton@cgiar.org), the lead author of the report.

The full scientific study is at doi:10.1016/j.gloenvcha.2008.08.005, for readers with access to Science Direct.

**The collective action underpinning the research:** This update is the result of a joint initiative among researchers from two CGIAR Centres, Dr Peter Jones, an independent consultant who worked for the CGIAR for many years, and Michigan State University. The authors gratefully acknowledge funding from the US National Science Foundation for some of this work.

## Newsbytes

### Study Identifies Fishing Nations Imperiled by Climate Change

With climate change threatening to ruin coral reefs, push seawater into freshwater habitats and worsen coastal storms, millions of fishery-dependent people worldwide could face unprecedented hardship. The WorldFish Center and collaborators on three continents published a study in the peer-reviewed journal *Fish and Fisheries* that identified the African countries most vulnerable as Guinea, Malawi, Senegal and Uganda. Vulnerability arises from the combined effect of predicted warming, dependence on fisheries and limited capacity to adapt. Many vulnerable countries are among the world's least developed and poorest, in which fish typically provides 27% of dietary protein, or double the 13% figure of less vulnerable countries. More:

[www.worldfishcenter.org/wfcms/HQ/article.aspx?ID=223](http://www.worldfishcenter.org/wfcms/HQ/article.aspx?ID=223).

### New Partnership to Create Carbon Measuring System for Landscapes

World Wildlife Fund, in partnership with Michigan State University, the World Agroforestry Centre, and the Center for International Forestry Research, is developing an innovative system for measuring, monitoring, and managing carbon in a diverse range of landscapes. The partnership, part of the Global Environment Facility and United Nations Environment Program's Carbon Benefits Project, will help enable some of the world's poorest people — in the most vulnerable places — to obtain the benefits of carbon sequestration. The Carbon Benefits Project provides a cost-effective system that integrates the latest remote-sensing technology and analysis, ground-based measurement, and rigorous statistical analysis in order to measure terrestrial carbon. More:

<http://www.carbonoffsetsdaily.com/usa/new-partners-to-create-carbonmeasuring-system-for-landscapes-6358.htm>

### New climate-ready maize varieties released in Malawi

Two new maize varieties — ZM 309 and ZM 523 — have been a success in Malawi. "We are grateful to CIMMYT for support in developing these new varieties that are suitable for Malawi's drought-prone areas," said Dr. Andrew Daudi, Principal Secretary, Ministry of Agriculture and Food Security, Malawi. "ZM 309 is going to be included in the national subsidy program for the 2009/10 growing season." Developed jointly by CIMMYT and the Ministry of Agriculture and Food Security, the varieties are suitable for other drought-prone lands with infertile soils in eastern and southern Africa, and in addition are resistant to maize streak virus, gray leaf spot, and other diseases. More:

<http://blog.cimmyt.org/?p=785>

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[http://www.ilri.org/regionalplan/index.php?option=com\\_content&view=article&id=74&Itemid=69](http://www.ilri.org/regionalplan/index.php?option=com_content&view=article&id=74&Itemid=69)

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