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Editor's Note: The full CGIAR Challenge Program on Water and Food analysis of climate change and river basins can be viewed [here](#).

Climate Change in Africa's Major River Basins Could Impede Continent's Farm Transformation Efforts, Increase Cross-Border Water Conflicts

Experts at Global Water Forum Warn Climate Shifts Will Increase Water Pressure on Already-Stressed Limpopo, Nile and Volta River Basins

Tshwane, South Africa (14 November 2011)—Climate change could significantly alter water flows in major river basins in Africa, presenting a new barrier to nascent efforts to better manage water for food production and to resolve potential cross-border water conflicts all over southern Africa, according to research findings presented at this week's Third International Forum on Water and Food in Tshwane, South Africa.

As part of a five-year global research project, scientists from the CGIAR's Challenge Program on Water and Food (CPWF) examined the potential effect from now through 2050 of higher temperatures and shifting rainfall patterns, caused by climate change, on river basins around the world. In the process, they say, some unsettling scenarios have emerged for parts of Africa.

"Climate change introduces a new element of uncertainty precisely when governments and donors are starting to have more open discussions about sharing water resources and to consider long-term investments in boosting food production," said Alain Vidal, director of the CPWF. "To prevent this uncertainty from undermining key agreements and commitments, researchers must build a reliable basis for decisions, which takes into account the variable impacts of climate change on river basins."

Particularly alarming are the projected changes in southern Africa's Limpopo Basin, which is home to 14 million people and includes parts of Botswana, South Africa, Mozambique and Zimbabwe. Using data averages from climate models by the Intergovernmental Panel on Climate Change, CPWF experts found that rising temperatures and declining rainfall in the Limpopo over the next few decades could deliver a one-two punch to the already marginal environment—depressing food production and intensifying poverty.

"We need to ask whether current agriculture development strategies in the Limpopo, which are predicated on current levels of water availability, are in fact realistic for a climate future that may present new challenges and different opportunities," said Dr. Simon Cook, a scientist with the International Center for Tropical Agriculture (CIAT) and head of CPWF's Basin Focal Projects (BFP).

"In some parts of the Limpopo even widespread adoption of innovations like drip irrigation may not be enough to overcome the negative effects of climate change on water availability," Cook added. "But in other parts, investments in rain-fed agriculture such as rainwater harvesting, zai pits and small reservoirs might be better placed, as there could be sufficient rainfall for innovative strategies to boost production. The key is to obtain the data needed to make an informed decision."

Climate change could also introduce uncertainties into the water politics of the Nile Basin, with the CPWF analysis showing that higher temperatures—a rise by 2050 of two to five degrees Celsius—have the potential to increase water evaporation to the point that it would “reduce the water balance of the upper Blue Nile Basin.”

Today, Egypt and Ethiopia appear to be making meaningful progress after years of tensions over Ethiopia’s plans to build dams upstream that would disrupt Egypt’s water supplies. Recently, the Egyptian government has also indicated a willingness to consider a comprehensive treaty for governing water resources on the Nile River Basin that would involve a pact among several other countries in the region.

“The new insights regarding the effect of climate change on river basins may indicate a need to revisit assumptions about water availability,” said Vidal. “But if we invest in research needed to support far-sighted water policy, then decision makers can obtain the information they need to address the new wrinkles introduced by climate change that could otherwise impede agreements and investments.”

In addition to the implications for the Nile and Limpopo, Cook said data also indicate climate change could affect water availability in Africa’s Volta River Basin. And as with the other basins, these shifts would need to be factored into an agriculture revitalization strategy for the region.

Overall, the analysis of the effect of climate change on water availability found higher temperatures are likely in all of the ten river basins studied globally, which include large areas in Asia and South America. But while the higher temperatures could increase evaporation, most water losses are likely to be offset by increases in annual rainfall, as the energized climate system turbo-charges the amount of water in the atmosphere.

But according to CPWF, the impacts of climate change on water availability will vary in magnitude and direction within and between basins and could flip-flop weather patterns from wet to dry that were once more or less stable. Even where more rain falls on an annual basis, minor shifts in its timing may present challenges in basins that have been “organized” over centuries to manage somewhat consistent patterns of seasonality.

“Such changes will create a management nightmare and require a much greater focus on adaptive approaches and long-term climate projections than historically have been necessary,” said Vidal.

In Africa, rainwater management is widely viewed as the key to improving both crop and livestock farming. Innovative ways to make productive use of rainwater are also being touted as a new “climate smart” approach to agriculture. For example, small reservoirs can be used to store water in dry periods or to help control flooding. Flood mitigation and management strategies will be crucial in areas with increasingly erratic climate and flash floods, such as the Limpopo and the Volta.

“These decentralized approaches to farming with rainwater are inexpensive, highly adaptable and provide immediate options for farmers to be their own water managers,” said Dr. Lindiwe Sibanda, CEO of the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN). “The climate in Africa’s river basins is already highly variable. Enhancing farmer’s adaptive capacity to respond to current challenges is smart even without climate change, but it is an absolute imperative now that we see what the future hold.”

Today, agriculture uses up to 70 percent of the world’s freshwater resources. The CPWF research highlights the increasingly important role of effective water management to allocate and utilize

available water resources to ensure food production stays abreast of population growth, even in times of climate uncertainty. Many experts are arguing that the strong link between climate change and food security should give agriculture greater standing in global climate talks.

“But water for food and agriculture and the impact of climate change on global food security is barely a blip on the radar for the negotiators meeting in Durban later this month,” added Sibanda. “Yet the first step towards climate security is ensuring farmers and the world’s poor will be able to feed themselves under rapid environmental change that puts the local and global food system at risk.”

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Events at COP-17 in Durban: The link between water, food and climate change will be further explored at the COP-17 in Durban. CPWF experts and partners will present on Saturday, 3 December at Agriculture & Rural Development Day. For more information, please visit www.agricultureday.org/.

Third International Forum on Water and Food, Tshwane, South Africa – November 14-17, 2011: The linkages between poverty, food and water will be further explored at this international forum that will bring more than 300 experts together. Particular focus will be on rainwater management, benefit sharing mechanisms and strengthening adaptive capacity of organizations to deal with rapid changes taking place. For more information, please visit <http://www.waterandfood.org/ifwf3/>.

The CGIAR Challenge Program on Water and Food (CPWF) aims to increase the resilience of social and ecological systems through better water management for food production (crops, fisheries and livestock). The CPWF does this through an innovative research and development approach that brings together a broad range of scientists, development specialists, policymakers and communities to address the challenges of food security, poverty and water scarcity. The CPWF is currently working in six river basins globally: Andes, Ganges, Limpopo, Mekong, Nile and Volta (www.waterandfood.org).