



**CHALLENGE PROGRAM ON WATER & FOOD: THEME 5 PROFILE**

# The Global & National Food & Water System

Global change will profoundly affect many aspects of water: its contribution to food production, the health of water-related ecosystems, rights and access to water especially by poor and marginalized people, the incomes of water users, and conflicts over water use. Policies and institutions at national, regional and international levels—some of which may promote global trends like trade liberalization or react to them—will likewise strongly influence the future state and fate of water resources.

Under Theme 5, the Challenge Program will improve knowledge of the complex interplay between global change and policymaking and use the results to build institutional capacity in this area. The aim is to support policymaking both within and outside the water sector so that it enhances food security and human health, promotes production of more food with less water, helps alleviate poverty, and protects ecosystems.

## global change coping with

Theme 5 research will provide a coherent basis for analyzing various scenarios of global change and the impact on water stakeholders, policies and institutions at multiple levels. Researchers will investigate the links between policies normally seen as lying outside the water sector, such as those on trade and macroeconomic issues, and policies specific to the sector, such as those on water rights, prices, and investment. They will evaluate policy-related strategies for adapting to change, mitigating its negative effects, and enhancing pro-poor agricultural growth.

Three priority research topics are the competing demands for water (from irrigation, industry, and households); national strategies for developing agriculture and fisheries; and the relationship between climate change and the global water cycle.

Specific benefits expected from having policymakers and their institutions apply the research findings and resulting analytical tools include the following:

- growth of agricultural production in irrigated and rainfed areas
- more effective use of water in less favorable, non-irrigated environments such as dryland areas
- reversal of degradation of watersheds and irrigated lands
- higher rural incomes
- protection and promotion of rights to domestic and irrigation water for the poor, women, indigenous communities and other vulnerable groups
- better management of disputes over water

Theme 5 research covers four broad areas in which policy and global change have a bearing on the future of water resources.

### FACTS AND FIGURES

- 1 billion people are without clean drinking water, 1.7 billion without adequate sanitation facilities.
- Reduced subsidies for water distribution can help improve water-use efficiency. For example, when water tariffs in Bogor, Indonesia, were increased from US\$0.15 to US\$0.42 per cubic meter, there was a 30% decrease in household demand for water.



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**Globalization, trade and macroeconomic and sectoral policies:** Globalization refers to the increased mobility of goods, services, capital, labor, information and technology throughout the world. A major engine of this trend is trade liberalization. Over the long term, globalization may generate significant economic benefits for developing countries. However, in the short term it can create economic and political instability, exacerbate inequities, make the poor more vulnerable and, in countries where agriculture is subsidized, reduce production and income.

Moreover, trade and macroeconomic policies can have profound effects on the allocation and use of water and other natural resources such as land and forests. A better understanding of the impact of global and national policies on water resources and food systems is therefore essential to mitigate the adjustment process and avoid long-term harm.

**Agricultural and urban water supplies—incentives, investment and financing:** In much of the world, low water prices and high subsidies for capital investment and water infrastructure maintenance are counterproductive.



They threaten effective and equitable water allocation and siphon off financial resources needed for further development of agricultural and urban water supplies. What makes the problem particularly serious is that future water development will require huge investments. New sources of water, for example, are increasingly difficult and expensive to exploit. At the same time, construction of traditional dams and reservoirs involves enormous environmental and social costs, especially the dislocation and resettlement of people.

Wise planning of new water projects demands more accurate estimates of the costs and benefits of alternative investments in supply and demand management strategies, by country and region. Theme 5 research will develop methods and tools to help policymakers to identify viable financing and incentive schemes and allocate resources more effectively.

#### **Transboundary water policies and institutions:**

River basins and groundwater aquifers that cross national, state, provincial or regional boundaries present major hurdles to effective water management. In many parts of the world, water is a major source of tension or conflict—between countries, between states or provinces within countries, and between groups of water users with differing interests. The main challenge is to build the institutional capacity and culture of cooperation needed to prevent economic, political or environmental crises before they happen. This research will investigate arrangements for sharing transboundary waters and processes for resolving or avoiding conflicts.

#### **Adapting to changes in the global water cycle:**

Water is not only vital for direct human consumption; it also contributes to the quantity and quality of ecosystem services such as food production, filtering of environmental pollutants, and the maintenance of healthy natural habitats for fauna and flora. But the world now faces the likely prospect of significant climate change and, with it, perturbations in global water cycles. These shifts may undermine the capacity of agroecosystems to meet food needs and could trigger severe water shortages especially for vulnerable populations.

Higher temperatures and the associated changes in hydrological regimes may, for example, shorten growing seasons and increase the frequency of extreme and destructive weather events. They may also have indirect effects on social and economic systems. In the short term, human influences, such as altered land-use patterns, urbanization, elimination of wetlands, and high nutrient loads of water systems, may further undermine the global water cycle's capacity to support food production. Research is required to investigate international and national policies that can prevent or mitigate adverse human impacts on global water cycles.

## RESEARCH QUESTIONS

- How can globalization and trade liberalization be managed to best enhance environmental policy and the management of water quality and water-related ecosystems?
- What proportion and types of investment should be made in water development versus agricultural research, education, health and nutrition?
- How much money should be invested in dams, taking into account future water needs as well as the financial, social and environmental costs of dam building?
- How can broader goals, including agricultural development, rural livelihoods, food security, water quality, and health and nutrition, best be integrated into international river basin agreements?
- How will changes in global water cycles affect food production and change the ways in which the poor, women and disadvantaged groups access ecosystem services?
- How can global and national policies and institutions prevent or mitigate the negative impacts of changes in global water cycles on water and food security and on the livelihoods of the poor, women and the socially excluded?



# IMPACTS AND OUTPUTS

- Improved livelihoods and reduced poverty; improved water quality and environmental quality; reduced frequency and intensity of water-related conflict; enhanced transparency, accountability and public participation in national policy processes
- Dissemination of policy and institutional knowledge through training courses, website communities, policy dialogues, and techniques for conflict resolution and mediation
- Development of databases and comprehensive methodologies, models and analytical frameworks for assessing global and national food and water systems
- Increased institutional capacity for evaluation of appropriate global and national water and food policies
- Publication of state-of-the-art research methods, research reports, journal articles, books, policy briefs and media briefings that evaluate and explain policies, institutions, and the dynamics of change in the global and national food and water system



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## CGIAR Challenge Program on Water and Food

The Challenge Program is an international research and capacity-building initiative to find ways of growing more food with less water—while improving rural livelihoods and protecting the environment. The initiative brings together water experts, NGOs and river-basin communities in Africa, Asia, and South America to find solutions to the world's growing water crisis. Its overall goal is to support increases in food production to achieve internationally adopted food security and poverty eradication targets by 2015—without increasing global diversions of water for agriculture above the levels of 2000. [www.waterforfood.org](http://www.waterforfood.org)

## research themes

- Crop Water Productivity Improvement
- Water and People in Catchments
- Aquatic Ecosystems and Fisheries
- Integrated Basin Water Management Systems
- The Global and National Food and Water System

## consortium partners

**CIAT**—Centro Internacional de Agricultura Tropical, **ICLARM**—The World Fish Center, **IFPRI**—International Food Policy Research Institute, **IRRI**—International Rice Research Institute, **IWMI**—International Water Management Institute, **ARC**—Agricultural Research Council, South Africa, **AREO**—Agricultural Research and Education Organization, Iran, **EMBRAPA**—The Brazilian Agricultural Research Corporation, **ICAR**—Indian Council of Agricultural Research, **MRC**—Mekong River Commission, **NWRC**—National Water Research Center, Egypt, **YRCC**—Yellow River Conservancy Commission, China, **CSIRO**—Commonwealth Scientific and Industrial Research Organization, Australia, **IRD**—Institut de Recherche pour le Développement, France, **JIRCAS**—Japan International Research Center for Agricultural Sciences, **CARE** International, **SEI**—Stockholm Environment Institute, **UC Davis**—University of California at Davis, USA, **WRI**—World Resources Institute

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