

From Scarcity to Security:

Managing Water for a
Nutritious Food Future



Ertharin Cousin and A.G. Kawamura
Cochairs

Mark W. Rosegrant
Principal author

March 2019

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Global Food Security Report 2019 Task Force

Cochairs

Ertharin Cousin, Distinguished Fellow of Global Food and Agriculture, Chicago Council on Global Affairs; Payne Distinguished Lecturer, Freeman Spogli Institute for International Studies, Stanford University; Former Executive Director of the World Food Programme

A.G. Kawamura, Panel of Advisors Member, Global Food and Agriculture Program, Chicago Council on Global Affairs; Founding Cochair, Solutions from the Land; Former Secretary of the California Department of Food and Agriculture

Task force members

Sanjeev Asthana, Nonresident Fellow, Global Food and Agriculture Program, Chicago Council on Global Affairs; Founder and Managing Partner, I-Farm Venture Advisors

David Bennell, Manager, Food, Land and Water, World Business Council for Sustainable Development

Doug Bereuter, Distinguished Fellow, Global Food and Agriculture Program, Chicago Council on Global Affairs; President Emeritus, Asia Foundation

Jessica Fanzo, Bloomberg Distinguished Professor of Global Food and Agriculture Policy and Ethics, Johns Hopkins University

Pierre Ferrari, President and CEO, Heifer International

Dan Glickman, Distinguished Fellow, Global Food and Agriculture Program, Chicago Council on Global Affairs; Vice President, The Aspen Institute; Executive Director, The Aspen Institute Congressional Program

Cedric Habiyaremye, PhD Candidate, Agronomy and Crop Science, Washington State University

Melissa D. Ho, Senior Vice President, Freshwater & Food, World Wildlife Fund-United States

Nnaemeka Ikegwuonu, Executive Director, The Smallholders Foundation

Prasanta Kalita, Professor and Presidential Fellow, University of Illinois at Urbana-Champaign

Peter G. McCornick, Executive Director, Daugherty Water for Food Global Institute, University of Nebraska

Rhiannan Price, Director, Sustainable Development Practice, DigitalGlobe

Isha Ray, Associate Professor, Energy & Resources Group; and Co-Director, Berkeley Water Center, University of California, Berkeley

Lindiwe Majele Sibanda, Senior Research Fellow, Institute for the Advancement of Scholarship, University of Pretoria

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Foreword

The fundamental starting point for food and for life is water. Over the past century, our understanding of water management and agriculture enabled us to dramatically decrease hunger, malnutrition, and poverty. We have developed new knowledge and technology that allow us to harness this precious resource and manage life systems, creating unprecedented abundance for much of humankind. Despite this progress, some clear lessons emerge from the pages of history. First, inequity continues to coexist alongside abundance and prosperity—that is the sharp truth for 821 million food-insecure people and 150 million malnourished children in the year 2019. Second, as water scarcity intensifies, we must remember that without water, there is no food, and without food, there is no security.

This report, *From Scarcity to Security: Managing Water for a Nutritious Food Future*, examines the urgent challenges created by water scarcity and the impact on food security. More importantly, it offers an evidence-based pathway forward. Aligning clean water development with agricultural development can yield multiple benefits and is crucial to producing enough nutrient-rich food for a growing global population. The report reminds us that agriculture is fundamentally a response to the need of 7.8 billion people to eat every day, 365 days a year. Sustainably producing food and the act of eating food cannot be separated.

The areas of food, water, and energy have been significantly transformed over the past 100 years, and new solutions to age-old problems leap from impossibility to feasibility to reality. Technological advancement creates a sense that no problem is too big for our collective innovation potential as long as we invest appropriately in research and development. But we must not ignore or diminish the need for collective action to solve structural and often systemic problems. We also must not underestimate the urgency of the challenge. The cost of inaction can quickly destabilize communities when water and food are at stake. Good-quality water is projected to become short in supply, creating significant strain on food production systems already challenged by changing weather patterns. The increased demands from rapidly growing urban populations create an even more alarming scenario, where water scarcity leads to increasing levels of insecurity around the world.

With the clock ticking, now is the time to strengthen our national and global capacity to identify, assess, and address these critical issues in the face of known and unknown challenges. This report explores these conundrums and ultimately concludes that we know how to address the challenge. It offers a timely set of solutions and principles we must pursue if we hope to achieve a world of truly equitable opportunity and abundance. Whether through hindsight or foresight, the facts will require all of us to acknowledge that sustainable, resilient food systems maintain a peaceful prosperous civilization.

As coauthors for the report, we would like to thank our fellow task force members for their insight, guidance, and commitment throughout this process. Each individual brought their expertise to this effort, effectively collaborating to shape the report's consensus-based findings and recommendations. We would also like to thank Dr. Mark Rosegrant, lead author, who brought his great wealth of knowledge and thought leadership to develop the report's content, as well as the numerous subject matter experts who provided valuable input. Finally, we would like to express our appreciation to the Bill & Melinda Gates Foundation for its generous support, which made this report possible.

Ertharin Cousin and A.G. Kawamura

Cochairs, 2019 Global Food Security Report

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EXECUTIVE SUMMARY



Tanzania. Credit: Greg Garrett

The world is running out of clean, fresh water to feed—and nourish—a growing global population. Approximately 2.4 billion people—more than one-third of the global population—currently live in water-scarce regions, and projections indicate that by 2050 over one-half of the world’s population could be at risk due to water stress. At the same time, global demand for water will continue to increase, driven by population growth, rising consumption, urbanization, and energy needs.

The stakes are high for protecting and effectively managing this vital resource, as increasing water scarcity threatens to undermine the progress that has been made on global food and nutrition security. Failure to treat water as a strategic, valuable, and limited resource will accelerate water insecurity, even for historically water-secure populations, and may threaten the economic and political security of nations, including the United States.

Agriculture depends on a reliable source of water, which will be severely tested by changing climate patterns, unpredictable water supplies, and increased demand for diverse, nutritious diets. Smallholder farmers, who largely rely on rainfall for their water supply, are at the greatest risk of total crop failure in the face of these challenges. Yet if they can manage water effectively, these farmers could be well positioned to produce the high-value crops needed to meet consumer demand and lift themselves out of poverty.

With the potential for severe economic, political, and humanitarian consequences, bold action and a commitment from all stakeholders is needed to address this critical issue. A combination of careful management strategies, technological innovations, investments, and policies around water are imperative to advance a sustainable, resilient global food system in the face of increasing water scarcity. In partnership with national governments, the private sector, and civil society, the United States must continue to lead in these efforts. With thoughtful planning and a commitment to sustainability, it will be possible to meet the water and food demands of current generations—while laying the groundwork for a nourishing food system in the future.

Competition for water

Water touches every aspect of our lives: food, health, environment, industry, and leisure. The competition for water resources is increasing between people and the natural environment as well as between cities and rural areas. Adding to this pressure, rising incomes are increasing demand for diverse, nutritious diets—including fruits, vegetables, legumes, nuts, healthy oils, and animal-source foods—which require more predictable supplies of water to produce at a time when changing climate patterns are making these supplies even less predictable.

By 2050 the global population is expected to increase to 9.8 billion, with 86 percent living in less developed countries and 70 percent living in rapidly growing urban areas. Farmers will need to improve their food production capacity to meet the needs of the growing populace, while expanding urban areas will also demand more water from a steadily decreasing supply. Global demand for water is generally projected to increase by 30 to 50 percent by 2050.

The fresh water necessary to produce crops and livestock accounts for the largest percentage of water usage among all sectors (71 percent), followed by industrial use (20 percent), and then domestic uses, including drinking water and sanitation (9 percent). Agriculture is expected to remain the largest user of freshwater resources in all regions

in the foreseeable future, despite rapidly growing industrial and domestic demand. Competition for water among its many users is only going to intensify.

Threats to food and water security

Intensifying sectoral competition and water scarcity problems—combined with declining reliability and quality of water supplies and increased degradation of ecosystems—are major challenges to future food and nutrition security. Greater variability in precipitation and increases in temperature will disrupt agricultural production, further threatening water, food, and nutrition security. These impacts will likely be felt most intensely in regions with the least resources to adapt to it.

Agricultural production in low- to middle-income countries is more vulnerable to adverse weather shocks due to lower coping capacity. Expanding access to sustainable irrigation methods can increase both productivity and climate resilience: while only 20 percent of all cultivated land is irrigated, this land accounts for about 40 percent of agricultural production. But irrigation also has costs and environmental impact if poorly managed, including overuse, groundwater depletion, soil degradation, and increased vulnerability.

As nonagricultural demand for water increases, water will be increasingly transferred from use for irrigation to other uses in many regions. This will create the potential for conflict as well as the loss of farm production and income, especially among smallholder farmers. The reliability and quality of both agricultural and nonagricultural water supplies will decline without significant improvements in water governance, management strategies, policy, and investment.

Strategies to move the world toward greater water, food, and nutrition security

Successful, sustainable water management in agriculture is imperative to achieve the food and nutrition security goals of a rapidly growing, urbanizing world. Several existing strategies can be used to address the challenge posed by increasing water scarcity. These include:

1. improving overall water resource governance through institutions that are transparent, accountable, efficient, responsive, sustainable, and geographically contextualized;
2. allocating water more efficiently through water rights, regulations and quotas, water pricing, water trading, and subsidy reform;
3. improving crop and livestock productivity per unit of water and land through agricultural research, development, technology, extension, and financing;
4. shifting diets and diversifying agriculture to reduce the demand for water; and
5. increasing the supply of managed water and expanding the irrigated area through investment in infrastructure.

In addition, expanding urban and periurban agriculture and focusing on effective international agricultural trade policies, including trade in “virtual” water, will further support water productivity. Ensuring that these solutions reach smallholder farmers and that women and

girls are empowered in the process is not only essential to increasing water productivity but will improve livelihoods and contribute to greater water, food, and nutrition security.

Continued US leadership and alignment of water and food security programs is needed to ensure future prosperity

At home, the United States has been at the forefront of addressing agricultural water management by empowering entrepreneurial farmers through technological advancements, research, and innovative implementation models. Globally, legislation like the Senator Paul Simon Water for the Poor Act of 2005 and the Senator Paul Simon Water for the World Act of 2014 are two examples of how US leadership is essential to catalyze innovations necessary to achieve global water, food, and nutrition security. While current efforts on both water and food assistance are to be commended, a multilayered and multidimensional approach is needed to reach the nation's stated foreign policy, national security, and humanitarian goals. Water challenges will only get worse if left unaddressed, and the incredible development gains of the past 50 years could be lost. Solutions to water scarcity and water access cannot be considered outside of the context of food production and the increasing food and nutritional needs of growing populations. As a global leader in both food security and water access efforts, the United States has the expertise, knowledge, and capability to ramp up solutions. It will take bold action and a commitment from all actors to work together toward the common goal of a water-secure and food-secure future.

This report lays out four key actions that can be taken by the US government—in partnership with national governments, the private sector, and civil society—to advance successful, sustainable water management in agriculture to achieve a nourishing food system for all.

Recommendation 1: Strengthen the environment for cooperation and communication between water development and food and nutrition security

- ▶ Create a formal, integrated, and multilayered process for communication and collaboration between implementers of the Global Water Strategy and the Global Food Security Strategy to improve whole-of-government efforts to expand sustainable agricultural development and water resource management simultaneously.
- ▶ Congress should permanently authorize the Global Food Security Act, in alignment with the authorization for the Water for the World Act, to give projects, grants, and research adequate time to come to fruition.
- ▶ Congress should request a comprehensive report from the administration on the impact of food and water insecurity on regional stability.
- ▶ Bolster the new Bureau for Resiliency and Food Security by increasing interdisciplinary efforts and requiring increased accountability and engagement.

Recommendation 2: Ease the challenges that hinder greater private-sector investment to expand sustainable water development for food and nutrition security

- ▶ Assess the use of artificial intelligence and expansion of the National Agriculture Imagery Program (NAIP) at USDA for solving major development issues such as water resource scarcity.
- ▶ As a part of the restructuring of the bureau, USAID should establish an interagency policy working group to formalize and coordinate a holistic approach that will make development finance tools available to local private-sector investors, from small businesses and farmers to multinational corporations.
- ▶ Congress should ensure the new US International Development Finance Corporation includes opportunities for short- and long-term investment in agriculture and water.
- ▶ The administration should support the development of an enabling environment for business through a standardization of regulations and support for rule of law.
- ▶ The administration should pilot collaborations with the private sector and civil society to design programs or innovations that build demand for nutritious diets.
- ▶ NOAA should continue to maintain current investments in digital mapping of water resources, and incentives should be introduced to increase sharing of critical data by commercial entities on this common platform.

Recommendation 3: Leverage US expertise and influence to improve water resource governance and sustainability

- ▶ In the face of rising investment from countries like China, the administration should employ all foreign policy tools available, with emphasis on technical assistance for water sustainability, to maintain US global leadership in strategically important regions.
- ▶ The administration should include education on water resource management at the state and national level as part of fellowships and academic exchanges.
- ▶ The administration should support active engagement with traditional multinational development institutions engaged in water management and development.

Recommendation 4: Strengthen support for agricultural R&D and interdisciplinary research at the nexus of water, food, and nutrition.

- ▶ The administration should coordinate and Congress should fund a significant challenge fund for water scarcity issues that encourages private-sector innovation.
- ▶ Support the creation of a USAID innovation lab at a land-grant university or expand existing innovation lab efforts to advance uptake and improvement of wastewater management and reuse for agriculture.
- ▶ Advance innovative new agricultural approaches to combat the impacts of a changing climate through targeted research.
- ▶ The administration should affirm and support greater research and development opportunities that are interdisciplinary and target the nexus of food, water, and nutrition.



African girl takes water from the river, Ethiopia. Credit: istock/hadynyah