



# Center on Food Security and the Environment

Generating Knowledge to Help Alleviate Global  
Hunger, Poverty, and Environmental Degradation

THE  
STANFORD  
CHALLENGE

*Seeking Solutions, Educating Leaders*

“With roughly one billion chronically hungry people in the world, 75% of whom depend on agriculture for their livelihoods, improving agricultural productivity at minimal cost to the environment is central to any efforts at poverty alleviation and environmental improvement.”

Rosamond Naylor, PhD '89

DIRECTOR, CENTER ON FOOD SECURITY AND THE ENVIRONMENT

PROFESSOR, ENVIRONMENTAL EARTH SYSTEM SCIENCE

WILLIAM WRIGLEY SENIOR FELLOW

FREEMAN SPOGLI INSTITUTE FOR INTERNATIONAL STUDIES/STANFORD WOODS INSTITUTE FOR THE ENVIRONMENT

## Center on Food Security and the Environment Generating Knowledge to Help Alleviate Global Hunger, Poverty, and Environmental Degradation

Although the world's supply of cereals has doubled in the past forty years, chronic hunger continues to be the silent killer of our time. 20,000 people die each day of causes related to malnutrition and extreme poverty. This outnumbers military and civilian deaths from war over the past twenty years by a factor of at least five to one. The rapid rise in global food prices in 2008 and the accompanying food riots and shortages throughout much of the developing world pushed an additional hundred million people below the poverty line. Despite the magnitude of these challenges, there are few university programs in the U.S. that directly address food security issues.

### WHAT IS FOOD SECURITY?

Food security embraces three important concepts: the consistent and sufficient *availability* of safe and nutritious foods; *assured access* to food through poverty alleviation and household income growth; and the ability of individuals to *utilize* food effectively within the context of their physical health, water supplies, and sanitation. Food security links health, development, the environment, and national security in unique and important ways that have been inadequately studied and funded.



COVER (CLOCKWISE FROM UPPER LEFT): INDIAN MILLET FIELD; SOLAR-POWERED DRIP-IRRIGATION GARDEN, BENIN; SALMON AQUACULTURE PONDS, BRITISH COLUMBIA, CANADA; WOMAN HARVESTING RICE, CHINA

CREDITS: ROSAMOND NAYLOR; MARSHALL BURKE (2); UNITED NATIONS





CREDIT: MARSHALL BURKE

PROJECT TECHNICIAN CLEANING SOLAR-PANELS FOR SOLAR-POWERED MARKET GARDENS, BENIN



CREDIT: MARSHALL BURKE

ROSAMOND NAYLOR, FSE DIRECTOR

### LEADING THE FIELD

With roots in food research that stem back to the 1920s, Stanford University's Center on Food Security and the Environment (FSE) has been an academic and policy leader in the food security field. FSE is led by a team of interdisciplinary scholars committed to addressing these global challenges through an applied research portfolio, a focused teaching program, and direct science and policy advising. Ten full-time FSE faculty and staff currently teach six courses to undergraduate and graduate student at Stanford and oversee seventeen projects in the United States, Asia, Africa, and Latin America.

As a joint center between the Freeman Spogli Institute for International Studies (FSI) and Stanford Woods Institute for the Environment (Woods), FSE is situated to play an important role in advancing Stanford's university-wide international and environmental initiatives. Through continued donor support, FSE and its contributors can make a real difference in ending global hunger.

### RESEARCH TO FEED THE WORLD

Productive food systems and their environmental consequences are at the core of the FSE research program. FSE's research portfolio embraces traditional topics such as technology, land use, and food consumption; equally important are non-traditional initiatives that link food systems to financial markets, energy markets, and national security. Understanding these linkages and evaluating the tradeoffs between agricultural productivity and environmental sustainability appear to be more important than ever before. Below are a few representative FSE projects.

### SOLAR MARKET GARDENS AND RURAL DEVELOPMENT

FSE has been evaluating the livelihood and environmental impacts of using solar-powered irrigation pumps to grow high-valued crops during the long dry season in Northern Benin. This region of West Africa is home to some of the world's poorest and most food insecure agricultural populations—often surviving on less than \$1 per person per day. Agricultural

### WILLIAM WRIGLEY SENIOR FELLOWSHIP

Leading FSE is director Rosamond (Roz) Naylor, a professor of environmental earth system science, distinguished researcher, and educator on food security issues. In 2008, Roz was appointed to the William Wrigley Senior Fellowship in recognition of her long-term commitment to combating global hunger and environmental degradation. Julie Ann Wrigley, '71, and Alison Wrigley Rusack, '80, along with Alison's husband, Geoffrey Claflin Rusack, joined together to endow the senior fellowship, which spans both FSI and the Woods Institute. Julie Wrigley and the Rusacks were motivated to provide permanent funding for an interdisciplinary faculty member as part of Stanford's multidisciplinary, cross-school efforts to conduct cutting-edge research on global environmental policy under the international and environmental initiatives of The Stanford Challenge.

Naylor is honored to be the first holder of this position, because it marks a new era at Stanford—one in which interdisciplinary research is valued and multi-institutional collaborations are encouraged. Long-term directorship funding and additional senior fellowships, such as this one, are critical to the continuity, expansion, and success of the FSE center.

CREDIT: MARSHALL BURKE



FIELD WORKERS HARVESTING RICE IN UBUD, INDONESIA

*"Agriculture is central to human survival, and is probably the human enterprise most vulnerable to changes in climate. Understanding where these climate threats will be greatest, for what crops, and on what time scales, will be vital to our efforts at fighting hunger and poverty over the coming decades."*

David Lobell, PhD '05

FSE FELLOW

ASSISTANT PROFESSOR, ENVIRONMENTAL  
EARTH SYSTEM SCIENCE



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yields are extremely low and are expected to worsen under climate change over the next three decades. In less than a year, the pumps increased household income and nutritional intake for participating women's farming groups. FSE is now scaling the project up in a dozen new villages in Northern Benin. The goal is to create a regional market and learning center for the technology and farm products to be replicated in other areas of West Africa.

**FOREST-FOR-FOOD TRADEOFFS**

Agricultural expansion is leading to major losses of pristine forest area in Southeast Asia and the Amazon, two of the largest rainforest regions remaining on the planet. This forest conversion poses threats to global and regional climate regulation, hydrological cycles, biodiversity, and watershed quality—and ultimately to agricultural productivity itself through the loss of forest ecosystem services. There is debate as to whether increased crop productivity can slow the loss of forest area in the future, or whether the conversion of forest to croplands will persist with rising global demand for agricultural products. FSE provides more analytical rigor to this debate and creates an avenue for policy reform, focusing on global palm oil demand and forest conversion in Indonesia and Brazil.

**CLIMATE AND AGRICULTURE**

Climate change impacts, such as increased temperature, changing rainfall patterns, and drought, could pose significant risks to poor and hungry populations, particularly in sub-Saharan Africa and South Asia. By 2030, the production of staple crops in some of the poorest parts of the world could decline by 30 percent or more in the absence of adaptation. The resulting crop shortages would likely cause food prices to rise and drive many more into poverty. Africa is particularly vulnerable to climate change since over half of the economic activity in most of the continent's poorest countries is derived from agriculture, and over 90 percent of the farming is on rain-fed lands. FSE research focuses on which agricultural adaptations should be prioritized, where, and for what crops.

**GIVING OPPORTUNITIES**

The Center on Food Security and the Environment relies on support from its friends, as well as from national and international foundations and corporations, for the funding of the program's research, teaching, and outreach activities. FSE offers a variety of giving opportunities, and support is welcomed on many levels. To meet the center's substantive and financial needs over the next five years, FSE's fundraising priorities include:

**ENDOWMENT** ..... \$1 MILLION AND UP  
*Endowed funds would provide long-term stable funding for core research at the Center on Food Security and the Environment.*

**DIRECTORSHIP** ..... \$3 MILLION  
*A named and endowed directorship could be used to provide expendable funds at the director's discretion to support FSE research or to underwrite the salary of the director.*

**SENIOR FELLOWSHIPS** ..... \$2 MILLION  
*Named and endowed Senior Fellowships enable FSE to recruit new faculty to add expertise and to extend FSE's research and teaching. Gifts will be matched, resulting in an endowed fund of \$3 million.*

**EXPENDABLE FUNDING**

*Expendable funds support research, postdoctoral fellowships, and programmatic innovation. These funds enable FSE to respond quickly and appropriately to compelling research questions. Expendable funds in any amount are extremely valuable in sustaining and expanding these vital programs.*

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