111TH CONGRESS
1st Session

COMMITTEE PRINT

S. PRT.
111–10

GLOBAL FOOD INSECURITY: PERSPECTIVES FROM THE FIELD

REPORT TO THE MEMBERS

OF THE

COMMITTEE ON FOREIGN RELATIONS
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

FEBRUARY 6, 2009

Printed for the use of the Committee on Foreign Relations

Available on the Internet:
http://www.gpoaccess.gov/congress/index.html

U.S. GOVERNMENT PRINTING OFFICE
47–215 WASHINGTON : 2009

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
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LETTER OF TRANSMITTAL

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC, February 6, 2009.

DEAR COLLEAGUES: Roughly one billion people suffer from food insecurity—they are unable to consume sufficient calories for a healthy and active life. Chronic hunger has its most pernicious effects on children, mothers, and the sick. Children deprived of adequate nutrients suffer from lifelong stunting and cognitive deficiencies. The children of women who are pregnant or lactating also suffer physiological consequences of a poor maternal diet. The sick, especially those infected with HIV/AIDS, are unable to fight off the effects of disease. Those that are well spend an inordinate amount of time and income trying to provide food for their families.

The consequences of hunger are profound. Quality of life for affected families deteriorates as access to food decreases, affecting their productivity, and ultimately the economic growth of nations. Hungry children are unable to learn, and hungry adults are not productive. Hungry people are desperate people, and their hunger can breed instability as evidenced by riots in some 19 countries during the Spring and Summer of 2008. It is both a moral and a security imperative for the United States and other wealthy nations to address the root causes of hunger.

I recently directed minority staff of the Senate Committee on Foreign Relations to assess the causes and consequences of food insecurity in a number of countries, and to investigate how best to alleviate it.

The steep spikes in food prices that occurred in 2007 and 2008 caused some discomfort for Americans and it put an additional 75 million people worldwide into the category of hungry. Faced with a lack of access to food, poor families respond by cutting out more expensive, and often more nutritious food, followed by cutting back to one meal a day. With prolonged food insecurity, families often sell off farm animals for income, which plunges them further into poverty. Even a short episode of food unavailability can have very lengthy effects on families struggling to pull themselves out of poverty.

There is little reason for anyone to be hungry in a world in which we have the knowledge and resources to ensure that everyone has access to a nutritious range of food. Just as technological advances of the Green Revolution spurred large parts of Asia to increase farm yield, so too can technology help to increase agricultural productivity in response to growing populations. However, today's challenges are more than increasing the availability of food. Those living in poverty need enough income to ensure access to a varied

diet necessary for a productive life. Food insecurity is a problem of both availability and access, and both aspects must be addressed if we are to overcome hunger.

This report argues that both donors and developing countries have neglected to make investments in agricultural productivity and rural development. Just as agriculture formed the basis for the economic development of the United States, it can also be the basis for sustained economic growth and prosperity elsewhere. Investments in farm yield, in technology and its dissemination to farmers, and in education are vital. Addressing hunger is the essence of development. Food security both empowers individuals and has a multiplier effect throughout society—raising incomes, improving nutrition and productivity, spreading equality, and creating jobs through related industries.

I hope you find this report helpful in understanding the complex causes of food insecurity and the ways in which we as a nation can provide the leadership to solve it.

RICHARD G. LUGAR,
Ranking Minority Member.

GLOBAL FOOD INSECURITY: PERSPECTIVES FROM THE FIELD

INTRODUCTION

The Food and Agriculture Organization (FAO) estimates that farmers will need to double current output by 2050 to satisfy the demand for food due to population growth, urbanization, and rising incomes.[1] This is a daunting task, given that even today, about 1 billion people, or 1/6th of the world's population, already suffer from food insecurity. That is, day in and day out, 1 billion people are unable to secure a nutritionally adequate diet to keep them healthy and active. Of these 1 billion people, estimates put 100 million people in the category of highly vulnerable to suffering from the physical consequences of malnutrition. Childhood malnutrition claims the lives of up to 5 million children each year.

The effects of decades of neglect by donor and host governments of investments in agricultural productivity became apparent as food prices climbed steeply beginning in the Fall of 2007 and continuing into the Spring and Summer of 2008. While the causes of food price increases were many and varied, the consequences soon became clear as approximately 75 million additional people joined the ranks of the hungry. Estimates of the total number of people living in hunger are more than 900 million.[2] The actions by governments around the world that took seemingly rational steps to protect their own populations through trade restrictions also had a deleterious effect on food availability and food prices.

Much of the cause of price hikes was due to the unprecedented cost of petroleum that approached $150 a barrel by the Summer of 2008. High fuel prices drove up the costs of transportation and agricultural inputs such as fertilizer. Because many small holder farmers do not produce a surplus for the market, they were unable to benefit from higher commodity prices. Since then, gasoline prices have decreased, but food prices in some areas of the world remain high. More importantly, the crisis of 2008 demonstrated the fragility of global agriculture and how quickly disruptions in one area can spread throughout the world.

To overcome hunger, donor and host governments should adopt a long-term approach that puts agricultural productivity and rural development at center stage. To make advances, special attention should be given to harnessing the power of education and science. Developing appropriate technologies is vital to this effort, but using technology to solve problems will not happen unless countries have

[1] FAO, "The State of Food Insecurity in the World 2008."

[2] The World Food Program identifies 923 million people as food insecure, while the Economic Research Service of the U.S. Department of Agriculture estimates 982 million.

the human capacity to exploit it. Equally, the United States must urge other nations—both wealthy and poor—to avoid resisting proven technologies that promise remarkable farm productivity payoffs, while protecting the environment. A rural focus will have positive effects throughout economies, creating new businesses and jobs, promoting equity, and raising incomes. Those who are poor are also hungry; both problems must be addressed in tandem. The Food and Agriculture Organization[3] concluded, "It is now widely acknowledged by most stakeholders that the role of agriculture and the rural economy is fundamental for securing sustainable gains in the fight against poverty . . . A productivity-induced agricultural expansion can "pull" other sectors with it and increase economic activity and employment opportunities in rural areas." This recognition must be followed by action on the part of donors and host governments working in partnership.

PURPOSE AND METHODOLOGY

At the direction of Ranking Member Richard G. Lugar, the minority staff[4] of the Senate Foreign Relations Committee conducted a study of global food security as part of the committee's oversight responsibilities. Ensuring that all people are food secure is vital to U.S. national security in promoting a more stable and productive world. This study is similar in scope to previous staff reports, such as "The Petroleum and Poverty Paradox" issued in October 2008, "Embassies Grapple to Guide Foreign Aid" issued in November 2007, and "Embassies as Command Posts" completed in December 2006.

Staff visited ten countries to investigate the causes of food insecurity. In each country, staff sought to identify the conditions that produce food security or insecurity, and what types of donor country engagements and host country policies are necessary to improve food security. The countries visited were chosen based on the Global Hunger Index (GHI) compiled by the International Food Policy Research Institute (IFPRI) and supplemented by other figures on the percentage of populations suffering from malnutrition. Pairings of countries were chosen in various regions—with one being more food secure than the other. This produced a sample of countries demonstrating a full range of conditions, from food secure to chronically insecure. The ten countries visited were: Ethiopia, Uganda, Zambia, South Africa, Indonesia, Laos, Vietnam, the Philippines, Costa Rica, and Guatemala. Such a varied set of countries allowed a comprehensive picture of what causes food insecurity, and what government policies are conducive to development.

Of the sample of ten countries, Ethiopia fell into the category of "extremely alarming" rates of hunger, according to IFPRI, while Laos and Zambia are in the "alarming" category. Those with "serious" rates of hunger include Uganda, Vietnam, Guatemala, Indonesia, and the Philippines. South Africa suffers from "moderate"

[3] FAO, Regional Office for Asia and the Pacific: "The State of Food and Agriculture in Asia and the Pacific Region, 2008."

[4] This Senate Foreign Relations Committee minority staff study was coordinated by Connie Veillette with significant contributions from Jay Branegan, Dan Diller, Keith Luse, Kezia McKeague, Carl Meacham, Michael Phelan, and Aaron Whitesel.

hunger, with much of that localized among certain populations. Costa Rica has low rates of hunger.

Staff met with government officials, non-governmental organizations, universities and research institutes, multilateral organizations, and international financial institutions during their country visits. In Washington, D.C., staff met with officials from the United States Agency for International Development, the United States Department of Agriculture, the World Food Program, the International Fund for Agricultural Development, and representatives from non-governmental organizations, advocacy groups, and industry organizations.

FINDINGS

The spikes in food prices that occurred in late 2007 and 2008 were caused by a complex web of factors, some of which are likely to continue. Record oil prices drove much of the food price increases by raising the costs of transportation and agricultural inputs. However, even after oil prices dropped, food prices remained high in much of the developing world. These price spikes were only the most recent and vivid signs of a trend that has been growing. After decades of declining food prices, FAO's real food price index started to increase in 2002. By 2008, food prices were 64% higher than in 2002. The FAO reports rapid increases in chronic hunger during the 2003 to 2005 period in addition to that of 2007 to 2008. Last year, some 75 million additional people became undernourished. FAO estimates that there are 80 million more chronically hungry people in the world today than in the early 1990s.

The world's population is expected to grow, largely in the developing world, so that current food demand will double by 2050. An additional factor driving food demand and price increases is the growing prosperity in such countries as China and India that has resulted in greater consumption of food containing more protein. Preferences for meat and dairy products drive the demand for more commodities to feed livestock.

This expected demand will necessitate much higher agricultural productivity globally. Increasing farm yield is vital, but not sufficient for alleviating hunger. Hunger and poverty are two sides of the same coin. Addressing one can improve the other. Hunger is a problem of both low farm yield and lack of access to food. Rural land holders are not producing sufficient quantities and variety of food to provide for their families. They are also often unable to produce a surplus that would provide them with the additional income to access other foodstuffs in the marketplace, or to purchase other life necessities such as medications, or to keep their children in school. The urban poor and the rural landless suffer from access problems, driven by low income and high food prices. Both availability and access problems require sustained investments in farm productivity to stabilize prices, and more opportunities to raise incomes. A World Bank publication makes the case that investments in agriculture are a necessary component to addressing poverty:

"Agriculture alone will not be enough to massively reduce poverty but poverty reduction will not happen without agriculture."[5]

The findings of this report include:

• High food prices threaten to erase recent advances in alleviating extreme poverty.

• Demand from growing and wealthier populations will continue to test the world's ability to feed itself.

• The use of technology, education, research, and extension are weak in chronically food insecure countries. National agricultural research and extension services are equally in poor shape and have not been able to contribute to economic growth.

• Some populations—children, women, and the ill—are more vulnerable to undernourishment and are affected to a greater degree by fluctuations in food prices and availability.

• Wealthy countries have based their development on a strong agricultural sector, and that sector has been the foundation for industry and commerce.

• Agriculture in poor nations can provide a multiplier effect for development, spurring new business and industry, building new markets, raising incomes, improving nutrition and health, and ensuring that children stay in school, among other benefits.

• Some middle income countries have segments of their populations that are food insecure, representing serious equity problems that can have implications for political stability.

• Attention to small and medium holders can produce high rates of return. Basic investments in better fertilizer, seed, and irrigation can produce fast and high returns.

• The burden of food insecurity falls hardest on women who are often heads of households. Providing them assistance has multiple benefits ranging from higher incomes, better childhood nutrition, and reduced school drop-out rates.

• Trying to support a growing population by expanding land under cultivation would have drastic environmental effects. Instead, policymakers should seek to get more production from existing farmland in order to prevent deforestation, soil erosion, and the adverse effects of climate change, and to improve farm yield. Investments in science and technology are necessary to overcome potential environmental problems.

• The United States has the opportunity to advance its humanitarian goals by leading a global campaign to eradicate hunger. It is in the U.S. national interest to promote global food security.

• Food secure countries have certain characteristics that are not shared by moderately and very insecure countries. The former have benefitted from government policies that are conducive to agriculture and rural development, with a history of investments in agriculture, infrastructure, education and research, extension, and stable land tenure systems.

• By contrast, very insecure countries are marked by government policies that do not support agriculture, including weak public investment in farming, poor infrastructure, weak university and

[5] "Making Agriculture a Development Priority," *Development Outreach*, World Bank, October 2008.

agricultural research systems, poor or nonfunctioning extension services, and unstable land tenure and farm size.

• Moderately insecure countries share many of the characteristics of the very insecure but have shown a higher commitment to the rural sector.

RECOMMENDATIONS

Fighting hunger should be a centerpiece of U.S. foreign assistance policy. The eradication of global hunger serves U.S. national security interests and reflects the humanitarian nature of the American people. Hunger and poverty are destabilizing forces. Food riots that occurred in 2008 demonstrate the volatility of food insecure populations. Investments in agriculture, education, and technology have a multiplier effect, forming the basis of related development, creating jobs and business opportunities, raising incomes of those living in poverty, and improving health. The United States, working with other wealthy nations, should lead this effort.

The Committee staff developed specific recommendations that should guide U.S. foreign assistance policy and approaches.

(1) Donor countries and host governments need to increase resources for agricultural productivity and rural development.

(a) Foreign assistance programs and projects should be responsive to national development plans, but should also encourage governments of developing countries to make greater investments in agriculture and rural development.

(b) Foreign assistance projects should be better coordinated among donor agencies at the country level. Coordination should encompass a set of development principles that respond to the development needs of each host country, and that include a division of labor among donors when appropriate.

(2) Strengthening national agriculture research and extension services is key to increasing farm yield and raising incomes.

(a) U.S. foreign assistance should seek to strengthen extension services so that small and medium holders benefit from learning more productive and sustainable farming techniques. A special emphasis on reaching women, many of whom are the sole income earner of the family, should be incorporated into extension programs.

(b) U.S. foreign assistance should help improve agricultural research programs, whether they are governmental, private, or university-based. Research programs should include a public outreach component so that information is available to those who need it. In some situations, instructing researchers in English would help integrate them into international research exchange of information.

(c) U.S. policy should help countries understand the benefits of biotechnology, including GM, and support the development of regulatory frameworks that would facilitate its adoption while responding to concerns about its application.

(3) Institutions of higher education can play a vital role in increasing human capacity and disseminating knowledge.

(a) U.S. programs, such as the Collaborative Research Support Program (CRSP), should be strengthened so that U.S. universities can partner with foreign universities on specific research agendas.

(b) A program should be established to assist foreign universities to strengthen their agriculture departments, including teaching and research capabilities. Such a program should also engage with U.S. universities through faculty, student, and administrator exchanges. U.S. assistance to strategically located universities with capable facilities can help them serve as regional hubs for a network of university activity in the field of agriculture.

(c) Existing international research centers should participate in the development of globally networked agricultural universities in order to disseminate the benefits of research and to build research capacity.

(4) The focus needs to be on small and medium land holders to achieve near term agricultural productivity gains and to address extreme poverty.

(a) Strengthened extension programs are vital to helping small holders increase their yield and farm in ways that are environmentally sustainable.

(b) Programs should empower individuals by giving them the tools and incentives to produce surpluses and to participate and help create vibrant rural economies. Emergency food assistance should be designed so as to prevent dependency. Rather, such programs should include components that incentivize economic activity.

(5) Commercial agriculture should not be neglected. Increasing its capacity and providing productive linkages with small and medium holders should be an objective.

(a) In countries having food supply problems, relying on commercial agriculture to achieve higher levels of food production should be encouraged. Providing for an environment that supports more investments is an important component. Commercial operations that have related industries or business activities provide opportunities for job creation for the rural poor and landless.

(b) Programs that encourage small and medium holders to increase their production for commercial sale or to produce components needed by large enterprises promote important horizontal linkages.

(6) Host government capacity to design and implement sound policies needs to be strengthened.

(a) U.S. assistance should incorporate good governance, anti-corruption, and strengthening of civil society.

(b) Government policies to improve productivity should work with and complement free market principles rather than distorting markets.

(c) In many cases, assistance to government ministries that oversee agriculture, science and research, and education is necessary.

(7) Investments in infrastructure are necessary—better roads, markets, irrigation systems.

(a) U.S. foreign assistance programs should coordinate with other donors on transportation infrastructure projects to economize resources.

(b) The Millennium Challenge Corporation should continue to finance infrastructure.

(c) Complementary development projects should be designed around major infrastructure works.

(d) Irrigation, of all types and sizes, is necessary to increase agriculture productivity.

(8) The design of agriculture programs and projects should pay special attention to issues of land tenure. Without ownership, farmers are often unable to access capital and do not have the incentives to make improvements to their farming operations.

(9) U.S. assistance programs and projects should incorporate assistance to women who often bear an inordinate burden in caring for their families and in earning an income.

(a) The special needs of female head-of-household farmers should be addressed in the design of projects.

(b) Training in childhood nutrition should be incorporated into the design of agriculture projects for women.

(10) In responding to changing climatic conditions in many parts of the world, sustainable agriculture or conservation farming techniques should be employed to conserve water and prevent soil degradation and deforestation.

(11) Free markets should be allowed to work, but price stability should be the goal so that wild price fluctuations are avoided.

(12) Small farmers must have access to credit in order to purchase inputs and make investments in their farming operations.

(13) Governments of developing countries should show caution in response to proposals by foreign governments and corporations to farm vast tracks of land for export. These types of operations, if not designed with transparency, run the risk of becoming an extractive industry, with the attendant vulnerabilities to corruption and lack of benefits to the home country.

(14) The international donor community must come together at the country level to better coordinate aid activities, starting with agreements on development principles and working with host governments to adhere to national development plans.

THE NATURE OF HUNGER

According to the World Food Program, there are approximately 923 million people who suffer from chronic food insecurity. Day in and day out, nearly 1 billion people, or about ⅙th of the world's population, struggle to secure enough food to eat. Chronic hunger is a structural problem. Either the system of food production is not adequate to meet the needs of everyone, or the means of accessing food is not sufficient. Chronic hunger can be exacerbated by manmade and natural disasters and can turn a chronically food insecure situation into famine.

Zimbabwe was once considered a breadbasket for southern Africa, but now 60% of its population subsists on one meal a day, according to the World Food Program. A cholera outbreak there makes the hungry even more vulnerable to death. Zimbabwe's situation is due to government policies that politicized land tenure and the agriculture sector, and were exacerbated by natural disasters. Civil war in Darfur has produced 3 million refugees and prevents farmers from working their fields.

Sub-Saharan Africa[6] suffers from higher rates of hunger than any other region. Its hunger index[7] (GHI), as calculated by the International Food Policy Research Institute, averages nearly 25, just slightly ahead of South Asia. By comparison, the world average is 15 points, with Southeast Asia, the Near East and North Africa, and Latin America all below 10 points. Since 1990, many countries have seen improved hunger indices, while others have fallen further behind. Of the countries studied in this report, Vietnam has experienced a 47% improvement in its GHI, while Zambia has slightly worsened. It is clear that some regions of the world, particularly Africa, are worse off than in previous decades, as evidenced by changing levels of food aid. Africa's share of all food aid donated globally has increased from one third in the late 1990s to one half today.[8]

Chronic hunger is strongly correlated with poverty. Populations living in extreme poverty—those eking out an existence on less than 50 cents a day—are the same who suffer from the worst food insecurity. Often living in remote rural areas with few assets and little access to fertilizer, better seed varieties, and modern farming implements, they are unable to feed themselves or produce enough income to access food. A chronic state of hunger further diminishes their productivity. IFPRI estimates that worldwide some 162 million people live in extreme poverty. Another 323 million live on 50 to 75 cents a day. About 485 million people exist on 75 cents to $1.00 each day.

Increases in food prices have exacerbated poverty rates as the poor spend more of their resources and energy to feed themselves. While the world saw steady declines in food prices since 1974, according to the International Monetary Fund, prices have increased steeply since 2005. The FAO's food price index showed an increase of 9% in 2006, 23% in 2007, and 50% between May 2007 and May 2008. Wheat and poultry prices doubled since 2003, maize tripled, and rice more than quadrupled. Those who suffer from chronic food insecurity are in especially precarious positions when prices increase.

The poorest of the poor can spend up to 70% of their incomes on food. When prices increase, their access to food is affected, leading them to restrict consumption. Long-term hunger has pernicious and lasting physical effects that are particularly hard on children. Children, especially those under two years of age, who are deprived of adequate nutrition suffer permanent effects, such as stunting, cognitive deficiencies, and increased vulnerability to disease that results in higher mortality rates. These conditions are often not reversible and have potentially enduring effects on their future productivity and that of their communities. It is often the case, as well, that families who need to spend inordinate amounts of time

[6] Throughout the report, Africa and Sub-Saharan Africa are used interchangeably.

[7] IFPRI's Global Hunger Index calculates food insecurity based on three factors: the under-five mortality rate, the prevalence of underweight children, and the proportion of the population considered undernourished. Its latest figures reflect data as of 2006. Because the figures are based on data obtained prior to the food price hikes in 2007 and 2008, it is probable that hunger has worsened in many countries.

[8] U.S. Department of Agriculture, Economic Research Service, "Food Security Assessment, 2007."

and funds securing food are unable to afford to send their children to school. Their lack of education will perpetuate poverty.

The economic growth of nations can be affected by long-term hunger as the productivity of food insecure people is affected. Those in extreme poverty often must resort to selling off their assets. In rural communities, this means selling farm animals, which limits resilience to future crises and reduces access to milk. Higher prices also reduce the amount of food that can be distributed by feeding programs.

WHY THE NEED FOR ACTION

Global food production is not keeping pace with population growth. By 2050 it is projected that population growth will require a doubling in farm output, yet growth rates in food production in some regions have stagnated. Worldwide, grain yield has been growing by about 2.5% a year. Africa's grain yield growth has been only about 1%. Meanwhile, its annual population growth rate in 2007 was 2.4%.[9] FAO reports that per capita production of Africa's most important staple crop—maize—has decreased by 14% since 1980, reflecting both population growth and low productivity. The World Resources Institute reports that Africa's total agriculture production on a per capita basis in 2005 was 19% less than in 1970.[10] Much of Africa is now chronically dependent on donor food aid shipments.

Population growth will put increasing stress on land, water, and energy supplies, and will exacerbate the effects of climate change. Increasing acreage under cultivation will not facilitate the necessary doubling of farm output. Although planted acreage can be increased productively in some areas, an overreliance on this step will cause widespread deforestation and put significant stress on local ecologies and water supplies. As poor populations become wealthier, diets diversify to incorporate more protein sources causing a growing proportion of food production to go toward livestock feed. As traditional energy sources are depleted, higher fuel prices will continue to put pressure on the development of biofuels.

These factors demonstrate that the focus of efforts to increase agricultural productivity must center on empowering people with the tools and information necessary to raise production on currently cultivated land. They also demonstrate that humanitarian efforts should place more emphasis on a long-term solution rather than depending on short-term provision of food aid. In fiscal year 2007, the United States provided $1.665 billion in P.L. 480 food shipments, but only $433 million in agriculture assistance. In Africa, the U.S. provided $1.22 billion in food aid compared to just $121 million to help farmer productivity.

In the days of Malthus, people also worried that food production would not keep pace with a growing population. But Malthus and his contemporaries did not see the role that technology and innovation would play to forestall his dire predictions. They did not foresee the Green Revolution that was spurred by the work of Nobel Laureate Norman Borlaug and others. Today we must not allow an

[9] World Development Indicators 2007, World Bank.
[10] Paarlberg, Robert, *Starved for Science*, 2008.

aversion to modern agricultural technology to doom a part of the world's population to chronic hunger and poverty, and to threaten the developed world with higher food prices. We can either succumb to Malthusian pessimism, or embrace the Borlaugian faith in overcoming challenges through science and technology.

Negative trends in food security are projected to continue in many parts of the world. The U.S. Department of Agriculture's Economic Research Service projects that the number of undernourished people in Africa alone will increase by 10% over the next 10 years, possibly even reaching 645 million by 2017. In addition, gains that had been made in Asia are stalling. The situation will be exacerbated by slowing economic growth in response to the current financial crisis, continued volatility in food and fuel prices, high rates of population growth in already poor parts of the world, and the effects of climate change. While it is estimated that food security in Latin America and the Caribbean will remain stable or improve, certain low income countries will not see improvements. Food insecurity in Haiti and Guatemala is projected to increase, and others such as Honduras and El Salvador will have to rely on increased grain imports.[11] The environmental impact of climate change is being felt in many parts of the world with an increase in volatile fluctuations between drought and rainfall, further affecting farm output.

The steep price increase that occurred in 2007 and 2008 laid bare some of the underlying structural factors that are cause for concern. While low food prices had been the norm for many decades, prices began to increase in 2002, and grain prices spiked by about 50% from 2005 to 2007, according to the U.S. Department of Agriculture. It is projected that 90% of this price increase will persist during the next decade. In the 2002 to 2006 period, price increases for those staples that constitute more than 60% of diets in developing countries were steep enough to bring about changes in consumption patterns. Corn prices increased by nearly 30%, wheat by 20%, soybean oil by 18%, and sugar by more than 80%.[12]

The 2007 and 2008 price hikes further worsened an already precarious situation. The International Monetary Fund estimated that from January 2007 to January 2008, aggregate food prices increased by 33%. Many countries are net importers of food. Higher international commodity prices limit their capacity to maintain sufficient levels of food imports. Eleven countries in Africa rely on imports for more than 50% of grain supplies. The increase in oil prices exerted upward pressure on food prices as transportation costs were driven higher.

The need for action seems self-evident on moral, economic, and security grounds. Drawing on the humanitarian nature of the American public, there is a clear moral imperative to help families overcome hunger, and recent public opinion polls show that Americans believe the country should do more to address global hunger.[13] Advances that have been made in recent years to alleviate

[11] USDA, Economic Research Service, "Food Security Assessment, 2007".

[12] *Ibid*. ERS estimates that grains constitute 63% of diets in low-income Asian countries, and nearly half of those in Africa.

[13] The Chicago Council on Global Affairs conducted a survey on American public opinion in 2008. It showed that support for addressing hunger, health, and agricultural productivity was stronger than for poverty or development.

poverty and improve health are threatened by worsening food access and availability. This reversal is already evident by measuring the number of malnourished that increased from 2006 to 2008. Previous gains achieved in promoting health could be threatened by the physiological effects of malnourishment that diminish the body's ability to fight disease and fend off infection. Even common diseases that are easily overcome will be the source of increased mortality in a chronically malnourished body.

Global economic growth is considered to benefit all nations. It increases customers for U.S. products and provides less expensive products for American consumers. From a budgetary perspective, the past investments in the form of U.S. development assistance may be erased by the consequences of high food prices in the developing world. As economic growth stalls in developing nations, they will be less able to purchase U.S. goods and services. Conversely, as incomes rise in the developing world, nations will be less dependent on U.S. foreign assistance.

Finally, global food security can produce a more peaceful and stable world. According to IFPRI, violent food protests took place in 19 countries from January 2007 to June 2008. Six of those countries are considered to be moderately food insecure, 7 are seriously food insecure, and 6 have alarming rates of hunger. Of the countries studied in this report, Indonesia had violent food riots, while non-violent protests occurred in South Africa, Guatemala, the Philippines, and Ethiopia.

ISSUES AFFECTING FOOD SECURITY

Staff identified several factors that contribute to food security. When these factors are present, staff found that hunger and poverty rates were lower than in countries where the factors were absent. Pivotal factors include: investments in agriculture and rural development; investments in infrastructure; investments in education, technology, science, and extension; sound land tenure systems; and a healthy respect for market forces. All of these factors require the sustained engagement of governments in developing public policies that promote equitable economic growth.

Table 1 indicates the countries under study and the main variables used to assess them. IFPRI's Global Hunger Index (GHI) and the proportion of the population reported to be malnourished were used to categorize countries as either: food secure; moderately insecure; or very insecure. Food secure countries have very low GHIs, although they may have sizeable populations that are considered malnourished. The very insecure are countries that have chronic hunger problems, very high hunger indices, and require significant food donations. The moderately insecure are those that have middle-range hunger indices, but are not chronically reliant on food aid. Sometimes these countries can even be net exporters of food.

This study attempts to make some generalizations based on the data collected for these ten countries. It should be noted, however, that the small number of countries in this sample is inadequate for robust conclusions per the standards of social scientific inquiry. Yet, some initial conclusions can be drawn, and those conclusions can be further tested with the addition of more case studies. None of the conclusions presented here sharply contradict those of other

studies. However, whereas other studies have looked at one or two causal factors, this study has attempted to examine a larger number.

Those conclusions are listed here, and a more expansive discussion of each then follows.

- Food secure countries all have certain characteristics that are not necessarily shared by moderately and very insecure countries. The differences between food secure and very food insecure are quite stark. The two food secure countries in the study have benefitted from government policies that are conducive to agriculture and rural development; a good natural resource base; investments in agriculture; good infrastructure; strong universities and research centers supporting agriculture; either good or previously good extension services; sound and stable land tenure including adequate farm size; peace and stability; and policies that are not hostile to genetically modified (GM) technology.
- By contrast, the very insecure are marked by government policies that do not support agriculture; little government investment in agriculture; poor infrastructure; weak university and agriculture research systems; very poor or non-existent extension services; and very poor land tenure and farm size. One of the three is hostile to GM technology (Zambia), while the other two have neither rejected nor embraced it.
- The moderately insecure share many characteristics with the very insecure. In these countries, government policies are weak in supporting agriculture, and government investments in agriculture have been anemic. Infrastructure is undeveloped; extension services are poor or non-functional; and land tenure and farm size are poor to moderately poor. But like secure countries, every country in this category is not hostile to GM technology, with two out of the five embracing its use (Vietnam and the Philippines). Governments in this category appear to be making greater investments in agriculture than those of the very insecure.
- It is clear that when governments implement transparent policies that provide support for rural development and agricultural markets, food security improves. This includes policies that attempt to work with, rather than distorting, market forces, and where policies are driven more by need than by cronyism or other political factors.
- It is less clear the degree to which having a good natural resource base is important. Some countries are just too poor to be able to exploit their resource base. Others, with resource deficits, may be able to overcome them. The components studied by staff included: the percentage of arable land; access to water; the effects of climate change; and deforestation rates. Two very insecure countries (Ethiopia and Zambia) were judged to have good or adequate resources.
- Where governments have invested budgetary resources into long term agricultural development, food security improves. Staff distinguished between rhetorical and real support, and excluded funding from the donor community.
- Infrastructure was judged to be poor in all countries but the food secure. Lack of roads and irrigation systems is a factor that

limits food security regardless of the presence or absence of other characteristics.

- Extension services are very poor in all countries except the food secure. Poor countries suffer from many factors that contribute to a lack of effective extension, but nearly all officials meeting with staff expressed very strongly the need to increase the number of agents and their effectiveness.
- Farmers who hold stable title to their land, can use it for collateral, and have access to enough land on which to make a living, all live in countries that are food secure. Very insecure countries score very low on this characteristic, while the moderately insecure score marginally better.
- The presence of peace and stability shows that this is a necessary, but not sufficient condition. Food secure countries are peaceful and stable; those with instability and conflict tend to be less food secure. But countries with peace and stability can still be very food insecure. Peace and stability do not cause food security, but they are beneficial to it.
- Most countries studied here do not reject GM technology; only one is hostile to it. Most others do not prohibit it, but neither do they embrace it. In many cases, this is due to a lack of resources to study or implement regulatory frameworks to guide its adoption. This is an area where U.S. support could have positive benefits.

Table 1. Factors Affecting Food Security

	Country	GHI 08	GHI 90	Popul hungry	Govt Policy	Nat Res	Ag Invest	Infra Struct	Educ	Extens Svces	Land Tenure	Peace Stable	GM Friendly
Secure	Costa Rica	< 5	< 5	5%	X	X	X	X	X	X	X	X	X --
	S. Africa	6.9	7.4	10.3%	X	X	X	X	X	X --	X --	X	X
Moderately Insecure	Indonesia	11.3	16.0	29.8%	X --	X	X --	■	X --	■	X --	X	X --
	Vietnam	12.6	23.9	35.5%	X --	X --	X --	■	X --	■	X --	X	X
	Philippines	14.0	18.9	24.5%	■	X	■	■	X	■	■	X --	X
	Guatemala	14.6	16.1	22%	X --	X	■	■	■	■	X --	■	X --
	Uganda	17.1	19.9	19.0%	X --	X	X --	■	X --	■	X --	X --	X --
Very Insecure	Laos	20.6	28.1	39%	■	X --	X --	■	■	■	■	X	X --
	Zambia	29.2	29.1	21%	■	X	■	■	■	■	■	X	■
	Ethiopia	31.0	44.0	46%	■	X	■	■	■	■	■	X --	X --

Sources: GHI data and proportion of population malnourished drawn from *Global Hunger Index: The Challenge of Hunger 2008*, International Food Policy Research Institute. Other data were collected by staff study missions during November and December 2008.
X indicates that the condition is present; X—indicates that some features of the condition is present; ■ indicates that condition is absent.

DISCUSSION

Agriculture and Rural Development Investments. Staff found that countries with long histories of investing in agriculture and rural development are generally food secure. While Costa Rica and South Africa have some segments of their populations that suffer from malnourishment, both have pursued policies that support agriculture. This is consistent with the development trajectories of most developed countries. Countries that are struggling with food insecurity are also those that neglected agriculture.

Developing countries are dependent on agriculture for much of their GDP yet investments in rural areas have fallen precipitously as nations have put resources into other sectors. As a result, agricultural productivity has also fallen. Nations have been lulled into complacency by decades of low food prices. As long as the growth in global food production was greater than population growth, the situation was sustainable. But demands on the world's farmers have increased, from population growth and demand for non-food crops, at the same time that agricultural productivity has stagnated.

Africa has been particularly affected, with grain yield increasing by only 1% annually compared to 2.5% in the rest of the world. In 2006, yield in Africa was just 40% of that in other developing nations.[14] The FAO reports that per capita production of Africa's most important staple crop—maize—has decreased by 14% since 1980. As suggested by a Chicago Council on Global Affairs report, the degradation in agricultural productivity coupled with population growth has doubled the number of people in Africa living in extreme poverty, from 150 million in 1980 to 300 million today.[15]

Donor governments have also neglected agriculture with official development assistance (ODA) allocated for agriculture falling to just 4% of total ODA in 2007. In Africa, with very high rates of poverty and low productivity, total agriculture ODA in 1989 was $4.1 billion compared to $1.9 billion in 2006. U.S. assistance for agriculture declined from more than $1 billion annually in the 1980s to as little as $200 million in 2003, when figured in constant 2006 dollars. (See Table 2.) Despite the commitments made by developed countries in the 1996 Rome Declaration on World Food Security, greater investments in agriculture have not occurred.

Of the countries studied here, large portions of their populations are employed in agriculture, ranging from 69% in Uganda, 60% in Vietnam, 45% in Indonesia, and 39% in Guatemala, according to the World Bank. Most of the developing world's population live in rural areas, including 88% in Uganda, 84% in Ethiopia, 80% in Laos, and 74% in Vietnam. Agriculture accounts for 47% of Laos' GDP, 44% of Ethiopia's GDP, and 43% Uganda's GDP.

Countries that have continued to make investments in agriculture are more food secure. Costa Rica and South Africa are examples of countries with high farm productivity and low rates of

[14] Government Accountability Organization: "International Food Security: Insufficient Efforts by Host Governments and Donors Threaten Progress to Halve Hunger in Sub-Saharan Africa by 2015," May 2008.

[15] The Chicago Initiative on Global Agricultural Development, "Renewing American Leadership in the Fight Against Global Hunger and Poverty," Chicago Council on Global Affairs, December 2008.

hunger. Both have seen their agricultural productivity increase from 1990, as calculated by the World Bank. According to IFPRI's Global Hunger Index, South Africa achieved a 33% improvement from 1990 to 2007 and Costa Rica gained by 36%. Other countries, while still considered food insecure, have made great strides, such as Vietnam with a 47% improvement, and Indonesia with a 29% improvement in their hunger indices.

Despite the importance of agriculture to their economies, many developing countries devote scant resources to it. The World Bank reports that for most agriculture-based countries, public investment in agriculture approximated just 4% of agriculture GDP in 2004. By comparison, Asian countries invested some 10% during the 1980s when the region experienced rapid increases in agricultural growth.[16] Efforts such as the Comprehensive Africa Agriculture Development Programme (CAADP) that call for member countries to allocate at least 10% of their budgets for agriculture are encouraging. However, most countries that have committed to this target have not reached it,[17] and staff found that much of the support for agriculture is more rhetorical than real. Zambia, for example, had increased its agriculture budget in recent years to around 8%, but that level has now fallen to a little over 5%.

However, judging a country's commitment to agriculture by its budget support is problematic. Not all budget resources actually contribute to agricultural productivity and long-term development. This is particularly the case in countries that spend significant resources on fertilizer support programs and grain reserves. Staff found that such programs were often mismanaged and politically driven. For example, 37% of Zambia's budget for agriculture is devoted to the Fertilizer Support Program, while less than 5% is devoted to infrastructure and irrigation development. Investments in extension services are very deficient. Staff found that most countries had poor to non-existent extension, and very few had plans to put more resources there.

Farmers generally lack access to agricultural inputs that can increase their yield. This is particularly true in Africa where both fertilizer and pesticide use is only 5% of the world average, according to the FAO. Farmers rely on sowing their fields by hand or with the help of draft animals. In Africa, there are just 1.1 tractors per 1,000 hectares, compared to 19.1 worldwide. Mechanized farming in Africa is a distant dream. Improved seeds could also increase yield, and their adoption in Asia has been widely accepted since the Green Revolution. In Asia, at least 80% of crops are planted with improved varieties of rice, maize, sorghum, and potatoes. This contrasts with only 20%–40% of crop area in Africa.

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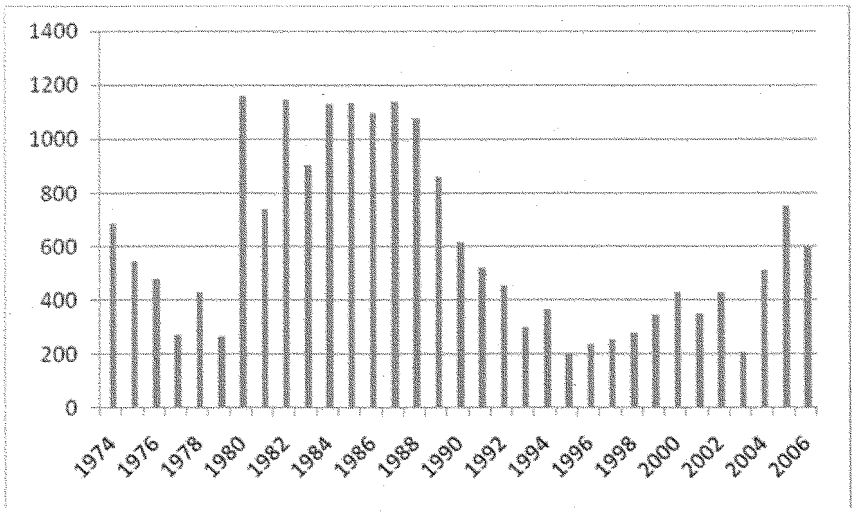
[16] "A Window of Opportunity for Poor Farmers: Investing for Long-Term Food Supply," *Development Outreach*, World Bank, October 2008.

[17] According to IFPRI and GAO, only four countries have met the 10% target: Malawi, Ethiopia, Mali, and Burkina Faso.

Table 2. Total U.S. ODA for Agriculture, 1974-2006
In constant U.S. 2006 dollars



Source: Prepared by SFRC staff with data from the Organization for Economic Cooperation and Development, Development Assistance Committee. Amounts are in constant 2006 dollars and represent calendar year disbursements.

Infrastructure Investments. Staff found that food secure countries benefit from having a transportation network that includes primary, secondary, and tertiary road systems that facilitate the movement of crops from farms to developed markets. Only Costa Rica and South Africa fit this category. All other countries visited had serious deficiencies in their transportation networks. Irrigation systems and access to clean water were also found more frequently in food secure countries.

Significant populations are excluded from participating in markets because of the lack of infrastructure. Those in rural areas must transport their crops, often on foot, to markets miles away from their farms. The World Bank reports that less than 50% of the rural population in Africa lives close to a usable road. Only 32% of Ethiopians and a little over half of Guatemalans live within 2 km of an all season road. Staff visited sites in most of the countries under study where farmers were forced to walk many miles on dirt tracks to access markets for their produce. In the case of dairy farmers, they must get their milk to a collection facility within one hour to prevent spoilage.

While good roads are vital to improving infrastructure, investments in irrigation systems are also important to raising productivity, particularly in areas prone to droughts. In some countries, water resources are sufficient, but farmers do not have access. Solutions as simple as treadle pumps have been able to improve the productivity of some farmers, but the need far outpaces the resources that have been devoted to small-scale irrigation. The World

Bank reported that many food insecure countries have very little irrigated land, as low as 0.1% in Uganda, 2.6% in Ethiopia, 2.8% in Zambia, and 6.4% in Guatemala. The FAO reports that the percentage of irrigated land in Africa is less than 1% compared to 5.4% worldwide. Irrigation can double farm yield over that of rainfed crops, and investments in irrigation have been shown to have rates of return approximating 15% to 20% in Asia and Africa.[18]

Both—roads and irrigation—are necessary if rural areas are to be revitalized and agricultural productivity increased. Many donor countries, including the United States, have refrained from doing large infrastructure projects in recent years, leaving that function to the World Bank. It was only with the sizeable compacts of the Millennium Challenge Corporation that the value of building infrastructure was highlighted again. In many countries, MCC, working to support the host countries' development plans, has built roads linking farms to markets, and markets to export facilities.

Education, Technology, Science, and Extension Investments. Staff found that food secure countries have made investments in the teaching of agricultural sciences, the dissemination of technology through extension services, and an agricultural research capacity. Schools and research institutes in Costa Rica and South Africa are robust. The very food insecure—Laos, Zambia, and Ethiopia—have failed to develop institutions that can effectively develop and disseminate agriculture technology. The moderately food insecure have some capacity that needs enhancement. The extent of extension services was found to be weak or nonfunctional in most countries. South Africa's extension network is considered to have atrophied in recent years, but its history of being stronger most likely contributed to the country's food security.

The world's major agricultural producing nations have long made significant investments in education, extension, and research. U.S. agriculture has benefitted immensely from the land-grant college system that improved farm technology and disseminated information to farmers. Investments in research have been made by both public and private entities. By comparison, public and private investment in agricultural research and development in developing countries is just ⅑th that of developed countries.[19]

In developing countries, this aspect of agriculture has been seriously neglected. Higher education budgets are anemic, university laboratories are in disrepair if they exist at all, and a general brain drain persists as students flock to other countries for education and then often do not return home. Staff found that most countries have at least one university with an agricultural science department, but that they are lacking in staff holding advanced degrees and have insufficient teaching capacities. Little research is conducted there and they rarely participate in any extension activities. Students who graduate with agricultural science degrees have traditionally gone into government service, but with cutbacks in budget resources for agriculture, this avenue has been limited in many countries. Schools are not teaching the entrepreneurial skills nec-

[18] "A Window of Opportunity for Poor Farmers: Investing for Long-Term Food Supply," *Development Outreach*, World Bank, October 2008.
[19] *Ibid*.

essary for graduates to create productive ventures. Agriculture is a business, but agricultural schools are not teaching business skills.

Two types of donor engagement are necessary—collaborative research and institutional capacity building. The USAID-funded Collaborative Research Support Program (CRSP) links U.S. land grant and other colleges with foreign universities on shared research agendas. In existence since passage of the Famine Prevention and Freedom from Hunger Act in 1975 (PL94–161), CRSP has involved dozens of U.S. universities and foreign universities in fields such as pest management, sustainable agriculture, and research on specific crops such as sorghum and peanuts. USAID has also supported international research centers, such as the Consultative Group on International Agriculture Research (CGIAR) with 15 research centers around the world. As leading proponents of agriculture technology, the CGIAR centers are contributing to global food production in regions in which they are located.

Programs to help build teaching and research capacity at universities have not been robustly funded by donors. Universities are not able to contribute to economic growth in their current state, but they have the potential to become engines of development with the proper engagement. Well-qualified graduates can create their own opportunities and add to commercial development. University-based research can develop solutions to localized agricultural conditions. Increasing human capacity, which comes through education, is as important as improving institutional capacity. A program to address these development needs should be an important component of U.S. assistance.

Staff found that the two food secure countries studied—Costa Rica and South Africa—both had numerous universities with advanced research facilities, competent staffs, and diverse curriculum. Their graduates have many opportunities in agriculture-related industries and their agriculture departments are thriving. Staff concluded that some of these schools can serve as regional hubs to assist other schools improve their agriculture programs. Staff also found that some schools in food insecure countries are poised to benefit from assistance, and that such investments could provide long-term and sustainable vibrancy to weak agriculture systems and promote needed economic growth.

Staff visited one or more universities in each country. Three universities, two in South Africa and one in Costa Rica, were observed to be in positions to assist other countries in their regions to develop improved teaching and research capabilities. Staff did not attempt to catalogue all schools that could fill this leadership role. The following schools were among those staff visited and judged to be in a position to serve as regional hubs for agricultural education:

• University of Pretoria, South Africa. UP has a variety of agricultural science programs and degrees offered and has excellent research facilities that attract students and researchers from other parts of the continent. Staff visited first-class laboratories where faculty and students were actively engaged in advanced research projects. The school has sophisticated laboratories with ¾ of its graduate students from other countries, largely African. The school is committed to working with other universities on the continent on

agriculture programs, and reports being limited only by staffing demands.

• University of Kwazulu-Natal, South Africa. K-Natal is South Africa's largest university with 43,000 students and has various agriculture programs, including an inter-disciplinary Food Security Program begun eight years ago. The school is involved in advising CAADP on its policy framework for food security promoting the following objectives: to improve resilience of the food insecure; to increase agricultural productivity; to provide economic opportunity for the vulnerable, and to improve nutrition. K-Natal is working with other universities and governments on food security. It currently has cooperative programs with four African universities.

• EARTH University, Costa Rica. EARTH University (Escuela de Agricultura de la Región Tropical Huméda) is a private, international institution that was established thanks to a group of Costa Rican leaders from government, agro-industry, and academia, with significant financial support from USAID and the W.K. Kellogg Foundation. It was inspired by the need for entirely new approaches in higher education in agriculture. The University is an international learning community, with students from 24 countries, primarily Latin American and Caribbean, but including 4 African nations.

The mission of EARTH is to prepare leaders with ethical values to contribute to the sustainable development of the humid tropics and to construct a prosperous and just society. Higher education in agriculture in many parts of the world has typically focused on the training of public sector employees. In an age of shrinking public sector expenditures and growing interest in the role of the private sector in revitalizing rural economies, this emphasis is increasingly being questioned. EARTH was created with an eye towards preparing graduates for the private sector, and particularly for careers as agricultural and rural entrepreneurs. In terms of curriculum, this approach emphasizes the importance of entrepreneurial skills, including practical experience in planning and operating a productive enterprise. Business administration, accounting, finance, management, and communication skills are important aspects of the plan of study.

Based on a visit to EARTH University, staff believes that establishing similar universities in strategic areas would be highly beneficial to global food production and rural development. Elements of the program should be promoted by USAID, especially in its work related to agricultural higher education in the following areas:

• Encourage faculties of agriculture to consider reviewing the focus of their curricula and educational methodologies in order to graduate professionals with the range of skills, abilities, and attitudes required to stimulate the agricultural and rural economy. While there is clearly a need to produce a new generation of researchers, teachers, and government employees, many universities in developing countries have been unsuccessful in preparing professionals willing and capable of leading change in the rural environment. EARTH University officials communicated that an emerging consensus in the agricultural field points to the need for agricultural graduates capable of integrating technical and scientific knowledge with practical and applied skills, environmental and so-

cial awareness, and entrepreneurial preparation and leadership skills.

• In addition to promoting transformation of existing models for undergraduate education, develop new models for technical and diploma level programs aimed at graduating community-based practitioners also capable of integrating technical and scientific knowledge with practical and applied skills, environmental and social awareness, entrepreneurial preparation, and leadership skills.

• USAID should also consider the establishment of regional hub institutions for entrepreneurship education, which could serve to catalyze change in business and entrepreneurship education at all levels—from graduate and undergraduate university education, to diploma and technical education, and including community-based education with farmers and small and medium sized producers.

• EARTH University can also serve as a model for integrated sustainable farming techniques that are scalable in agriculturally challenging topographies and also minimize energy and environmental impacts.

Staff identified universities in food insecure countries that have sufficient capacity that they could benefit from assistance. Many of these schools existed in countries that have demonstrated some commitment to improving higher education and investing in agriculture. It was determined that making investments in countries without this commitment would most likely not have high rates of return. It was not the objective of the staff report to catalogue meritorious schools that are in need of assistance. The following schools were either visited by staff, or were schools on which staff collected information, and represent those where some investments in foreign assistance could achieve lasting benefits.

• Makerere University, Uganda. Makerere University has previously received significant U.S. support. USAID's support in the 1980s and 1990s paid off according to current Dean of Agriculture at Makerere as the "best investment ever" in Uganda. Policy has shifted emphasis since then away from the public sector, and associations among academia, manpower, and research have been unable to maintain their purpose. In a country like Uganda, investment in the public sector is considered a primary investment of value. Re-establishing U.S. support would be a return to an important relationship valued by Ugandans.

• University of Philippines Los Baños. The Philippines has an unusually high literacy rate for a developing country, 93%, and an extensive university system. While there are a number of researchers at UP-Los Baños, agriculture has fallen out of fashion with students in favor of high tech, computers, engineering, etc. There has been a 50% decline in enrollment in agriculture courses at UPLB since the 1980s, and its agriculture economics department will see half the senior staff retiring in the near future. Many students find it difficult to get work in the field, said the dean, Liborio Cabanilla: "Our agriculture graduates go to work in call centers." UPLB would be an ideal candidate for assistance, with its English-fluent faculty and students, and its research infrastructure, which needs upgrading. The university does not participate in extension, but university officials expressed an interest in strengthening the moribund government system.

• Southeast Asian Food and Agricultural Science and Technology Center (SEAFAST), Bogor University, Indonesia. The center is designed to develop a national and regional system of partnerships with governmental, donor, and business sectors in the areas of food and agricultural science and technology development. It is dedicated to being a regional center focusing on improving food quality, nutrition, and food safety through science and technology. It is actively seeking mutual partnerships and cooperation with national, regional, and international institutions. One such partnership has been established with Texas A&M University.

Sound land tenure systems. Staff found that stable land tenure systems, defined as having stable land title and sufficient farm size to be productive, contribute to food security. The very food insecure countries all have unstable land tenure and small average farm size. In many countries, farmers hold no or unstable title to the land they farm. In Uganda, women are unable to own land despite comprising 49% of the agricultural labor force. Having unclear land titles means that they cannot access credit and have little incentive to make investments in their farms.

Many farmers do not have enough land to produce sufficient crops to enter the marketplace. Of the countries studied by staff, the average hectare per capita of the rural populations ranged from 0.2 in Laos, Ethiopia, and Vietnam, 0.3 in Uganda, 0.4 in the Philippines, Indonesia, and Guatemala, and 0.7 in Zambia. In Africa, 80% of farms are less than 2 hectares.[20] Small plot size is often the result of successive generational subdivisions, a trend that shows no sign of abating but suggests the need for diversifying the rural economy.

Land reform programs in many countries are more concerned with breaking up large and productive farms to redistribute to the landless, but with little support in maintaining their productive capacity. These programs are focused on political objectives rather than farm yield. Zimbabwe is the extreme example of land being taken out of production for political purposes with catastrophic consequences of agricultural productivity. Staff found land reform programs in South Africa, the Philippines, and Uganda, and reported problems with their implementation and their deleterious effects on productivity. One exception was Ethiopia where a land registration program has seen some positive results for resolving land disputes, creating credit opportunities, enhancing land use, and improving gender equality.

Respect for Market Forces. Staff found that free market policies—those that try to work with market forces—are more conducive to agricultural development. The most food insecure countries suffer from government policies that are not market-friendly and that interfere in the workings of local and national economies.

Creating a conducive business environment calls for policies that incentivize greater investments on the part of private sector business and the leveraging of those resources to promote equitable growth. Business will make investments where there are public policy commitments to improve infrastructure, build markets, and

[20] Paarlberg 2008.

provide for transparent and fair regulations of business activities. At the other extreme, governments that choose to rely entirely on market forces, rather than public investments, risk development patterns that are not equitable for large segments of the population and not reflective of societal needs or objectives.

Government policies that seek to create markets rather than distort them provide more benefits to farmers and consumers. Staff found that most fertilizer support programs were being used for political purposes and were often inaccessible to those most in need. These programs had severe negative effects on the private fertilizer market, and where they did reach needy farmers, they were not accompanied by extension services. In one country visited prior to a presidential election, a prominent campaign theme by the incumbent president promised to expand the fertilizer program to various segments of the population, such as the military and civil servants. Of equal concern is that such programs are prone to corruption in both design and implementation, which further undermines markets. Moreover, budget resources for subsidies take away funds from rural development.

JUSTIFICATION OF APPROACHES

Based on these findings, staff made recommendations on development approaches with the potential to have the greatest impact on alleviating hunger.

Focus on Small Holders. There are a number of reasons why there should be special focus on small holders. First, they comprise the majority of the poor and hungry. Seventy-five percent of people in developing countries live in rural areas, and about half are small holder farmers. Africa's small farmers comprise about 80% of the extremely poor.

Second, they are largely cut off from the local economy because they are not producing a surplus for the market. Raising their productivity can have a powerful multiplier effect as they are able to enter the market, not just as producers, but also as consumers. Both roles will spur increased economic activity.

Third, investments to assist small and medium land holders, such as improved seed and fertilizer, and better farming techniques can have very large and immediate returns.

Fourth, improving the productivity and incomes of the extreme poor will reduce the need for food aid, as they become self-sufficient in food production. The emphasis on small holders holds special promise for countries with large segments of their populations depending on farming for a living.

A focus on small holders should not signal that commercial farming can be neglected. Rather, the eventual development of more widespread commercial-scale farming is a goal. Many medium-sized farmers have the potential to become commercial in scope and produce for a national or international market. For net food importing countries, raising productivity through a larger and more diverse commercial sector is a reasonable approach. The commercial sector also benefits small holders and rural landless. The latter depend on these larger operations for jobs, and small holder farmers are often able to both sell to, and buy from, commercial farms.

Embrace Technological Solutions. The World Bank estimates that the average rate of return on investments in agricultural research and extension ranges from 35% in Africa to 50% in Asia. Their evaluation of 700 research and development projects in developing countries showed an average rate of return of 43%.[21] Despite the high payoff from such investments, budget allocations that would advance technology and its dissemination to farmers are anemic. Improved seed, either from traditional cross-breeding or from transgenic technology, is not available to most of the developing world even though these varieties have been shown to significantly improve yield and decrease the need for pesticides and water. As Robert Paarlberg notes in his book *Starved for Science*, when industrial countries adopted technology, their agricultural sectors saw significant gains in productivity and income. Yet, the same has not happened in developing countries. The CGIAR research centers are doing important research. New efforts, such as the Alliance for a Green Revolution in Africa, funded by the Gates Foundation and the Rockefeller Foundation, hold great promise. But, the development of improved seed and other inputs must be accompanied by the means to disseminate information to small holders and programs that make improved inputs accessible.

The resistance to genetically modified (GM) technology is particularly glaring when considering its history of safety and its benefits to farmers. In 2006, only 22 countries were using transgenic seeds on about 100 million hectares, equivalent to about 8% of all cultivated land. The only GM seed that is widely used by small holders has been Bt cotton, which is used for insect resistance, mainly by farmers in India and China. Its use has been shown to increase incomes and provide significant environmental and health benefits from reduced pesticide use.[22] The development of GM varieties that respond to the needs and environmental conditions of small holders in developing countries could provide a quantum leap in terms of income and benefits. This will not happen without public support or through public-private partnerships.

Empower Individuals rather than Enable Poverty. The objective of development projects should be sustainability. That is, will the intervention promote and support an activity that will be able to thrive on its own if donor support is eventually withdrawn? This most often happens when the design is to empower individuals and create an incentive structure for sustained economic activity. Programs that provide assistance without also providing opportunities may be responding to a short-term need at the expense of perpetuating long-term poverty.

Staff had the chance to visit dozens of projects supported by USAID and managed by a number of private voluntary organizations. Several are highlighted here to demonstrate the dynamic of empowerment and the possibility of having a powerful multiplier effect.

- MRI Seed, PROFIT (PROduction, Finance, and Improved Technology) in Monze, Zambia. With USAID support, the PROFIT pro-

[21] "A Window of Opportunity for Poor Farmers: Investing for Long-Term Food Supply," *Development Outreach*, World Bank, October 2008.

[22] "Capturing the Benefits of Genetically Modified Organisms for the Poor," *Development Outreach*, World Bank, October 2008.

gram is working with MRI Seed, a major Zambian seed company, to extend its retail operations to rural areas, helping to overcome small holders' lack of access to inputs and technology. The company hires "in-community agents," who work on commission, and trains them in sales and knowledge dissemination. The model increases profits for MRI at little cost, while increasing the accessibility of seed and information to farmers. The model has been adopted by other retail firms, with 13 major commercial input companies having now trained more than 800 agents, and having generated $1 million in new sales over 18 months. USAID and PROFIT report a 50% increase in yield among farmers adopting new input and service technologies, a general upgrading of farming practices with tens of thousands of hectares now using modern farming management practices, and a shift in small holders now viewing their agent as the main source of agricultural information, demonstrating the emergence of a private sector extension service.

• Mercy Corps/Wal-Mart/Fundación Agil in Chimaltenango, Guatemala. USAID partnered with Mercy Corps, Wal-Mart, and Fundación Agil to support development of a small-scale producer value chain for farmers from the Samajelá Taq Winaq Group. The group, nearly 40 men and women from six families, traditionally grew strawberries, corn, and beans but could not directly access markets and had not employed modern productive agricultural practices and harvest techniques. The consortium worked with the producers to develop the ability to produce high value market-oriented vegetable crops and directly access both domestic and international markets, including Wal-Mart. Producers adhere to strict sanitation rules and rigorous record keeping. In addition to increased agricultural abilities, members of the group are also expanding their knowledge base through accounting and business studies to improve the group's profitability. The project has not only improved the profitability and education of the six families involved, but will now serve as a model for similarly situated farming groups that have to date lacked direct access to markets and the implementation of strict production standards.

• AGEXPORT, Santiago Sacatepéquez, Guatemala. Staff visited Cuatro Pinos, an agricultural cooperative founded in 1979. It is a sophisticated operation designed to coordinate the growing of fruits and vegetables on small farms which are then moved to a central location for processing, packaging, and shipping to U.S. and European markets. The cooperative distributes productive seeds and fertilizer to small farmers and advises them on food safety standards. Staff believes that these efforts have been effective in increasing income for small farmers while still allowing them to grow some traditional corn and beans and providing employment for an additional 1,200 people in the processing facility. This value chain model appeared to be very successful with ample ability to continue growth.

• Productive Safety Net Programs, Ethiopia. When a systemic shock occurs—a natural disaster or price inflation—the extremely poor often cope by selling off their assets. This response further decreases their resiliency to future shocks and their ability to break out of a poverty trap. Productive safety net programs (PSNP) depart from the practice of costly and slow emergency food aid deliv-

ery and commit donors to multi-year targeted community investment. Such safety nets seek to help those in most dire need to weather these shocks without having to divest assets. The most productive programs require certain actions to receive benefits, such as keeping children in school or bringing them to clinics on a regular schedule. Some also require community work in exchange for support. Ethiopia's program, with support from the United States, seems to have already reduced the vulnerability of the current beneficiaries by strengthening their community assets value. Evidence suggests that since its inception in 2005, it has improved household security and community assets for its 7.2 million recipients in some of the country's most food insecure regions. Measurable progress has been reported in asset protection, adequate food for consumption, and increased availability of credit, which has also decreased labor migration and increased school attendance. During food price inflation in 2008, PSNP demonstrated that it had built substantial resiliency among its beneficiaries.

Raise Incomes. Hunger is strongly correlated with poverty. Poverty prevents both rural and urban populations from accessing a nutritional diet. Not all rural dwellers will be able to farm. This is self-evident given the already small plots of land that continue to be sub-divided among generations. The rural landless and the urban poor need jobs and incomes to escape both poverty and hunger. Promoting growth in rural areas is important in this respect. Agriculture-related industries are sources of jobs and drive the demand for locally produced goods and services leading to greater socio-economic growth. Increased incomes in rural areas stem the flow of economic refugees to cities, where they often join the ranks of the urban unemployed. This multiplier effect is one of the reasons why the World Bank claims that GDP growth originating in agriculture is at least twice as effective in reducing poverty as GDP growth originating outside of agriculture.[23] Because agriculture is the main source of income for so many poor people living in developing countries, activities that raise their incomes will have rapid effects on poverty.

Support Markets, Reduce Price Volatility, and Increase Market Information. Government policies to improve productivity should work with market forces rather than distorting markets. Market-distorting policies are not sustainable over the long run and do not include the incentives necessary to spur production and greater economic activity. Countries benefit when the market environment is conducive to private investment. Factors that contribute to such an environment include transparency in transactions, a reliable and fair regulatory framework, and investments in infrastructure—roads, irrigation, markets, to name just a few.

Making farming profitable while keeping food accessible through low prices is a tricky proposition. Volatile price fluctuations in necessities like food and fuel introduce unpredictability into the already tenuous environment of living in or near poverty. Small-scale farmers, who are unable to produce a surplus, do not benefit from higher commodity prices, but they are hit with increased costs of

[23] World Bank, World Development Report 2008, Agriculture for Development, 2007.

agricultural inputs for such basics as seed and fertilizer. What planning they are able to do for the next growing season can be upended by a price fluctuation of an input or commodity.

Nations should pursue price stability[24] while not falling prey to price stabilization policies that do more harm than good. The latter approach often involves drastic interventions in the economy with price floors, ceilings, or subsidies that end up distorting the market and thereby disrupting economic growth. Instead, supporting a more robust national food production system that produces consistent annual yields will help to stabilize supply and prices and makes sense if, as most economists argue, steep price increases signal supply problems. That stability will help farmers to plan and invest in future production. Natural disasters will disrupt production, and climate change effects in some areas will present challenges. But notably, countries that were not dependent on imports of staple crops were better able to weather last year's price increases.[25] That is, national food production served as a buffer to price fluctuations.

Price stability can also be enhanced by improving farmers' ability to participate in the market. Small holders have inadequate access to information that would help them make buying, selling, and investment decisions. Often located far from markets, they are disadvantaged compared to those who have market information. Programs that have made cell phones available to farmers have had major impact on markets. A recent study by the Center for Global Development found that once cell phones were introduced in Niger, the variance in grain prices across markets was narrowed by 20%, and the variance of grain prices during a 12-month period narrowed by 12%.[26] Their access to timely information helps them decide where and when to sell their product and purchase inputs with beneficial effects on raising incomes and productivity and providing some semblance of price stability.

Integrate Nutrition into Food Security Programs. As food prices increase or food becomes less available, the poor must cut back on consumption, or cut out sources of important nutrients such as protein. The FAO reports that diets in low-income countries comprise mostly cereals, roots, and tubers, but minimal amounts of meat and dairy products, oil and fats, and fruits and vegetables. A diverse and nutritional diet is largely unaffordable to the poor. Even in countries with moderate food insecurity, staff found alarming rates of malnutrition due largely to dietary reliance on a limited range of staple foods. Rice can comprise about half of daily diets in Asia.

The issue of child nutrition is particularly compelling as evidence shows that sustained lack of nutrition can have lifelong consequences for productivity and quality of life. The FAO estimates that just 40% to 50% of children under the age of two in Africa have a sufficiently nutritious diet. During the first two years of life,

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[24] C. Peter Timmer and David Dawe in "Managing Food Price Instability in Asia: A Macro Food Security Perspective," in *Asian Economic Journal*, Vol 21, No. 1, 2007 urge that food price stability become a focus of research and policy.

[25] USDA, Economic Research Service: "Food Security Assessment, 2007," 2008.

[26] Center for Global Development, CGD Notes: "'Can You Hear Me Now?' How Cell Phones are Transforming Markets in Sub-Saharan Africa," Jenny C. Aker, October 2008.

children need a sustained and high nutrient diet in order to develop physically and intellectually. Without such a diet, children can suffer the permanent consequences of stunting, cognitive deficiencies, and increased vulnerability to disease and mortality. The World Bank reports that 42% of children in Laos are stunted despite the country's progress in reducing maternal and childhood mortality. Indonesia, which has improved its overall hunger index, shows a negative trend in child malnourishment, increasing from 24% in 2000 to 28% in 2005, according to UNICEF. Vietnam, another country that has improved its hunger index, still has very high rates of child malnutrition with some estimates as high as 4 million children under the age of five.[27] The development of improved crops that are nutritionally fortified with beta carotene or omega-3 holds great promise in overcoming nutritional deficiencies.

Achieve Better Donor Coordination in the Field. In many developing countries, it is common to have dozens of donor agencies and even hundreds of implementers managing programs across all sectors. It is also common that very little consultation among the main donors takes place with much frequency, and rarely is there any semblance of coordination. This lack of coordination can have two negative consequences. First, programs can actually work at cross purposes, with one donor urging policies and designing programs that undermine other approaches. Second, donor agencies that follow disparate projects and agendas are unable to achieve greater efficiencies. Working in coordination can have a greater development impact, for example, designing projects complementary to a large infrastructure project. In the current environment of fiscal pressures, donors should work together to optimize their investments.

Experiences in Zambia demonstrated that with the host government's encouragement, donor groups can coordinate their activities effectively. The donor community has created sub-groups by sector to share information on approaches and activities. The agriculture group, led by the United States, the World Bank, and Sweden's Sida, has developed a set of principles for all donor agencies working in agriculture. The common principles are to ensure that all programs are working under the same rules of engagement. Staff did not find this same level of coordination in other countries under study.

Utilize Conservation Farming Techniques. With predicted population growth causing increased food demand, it is certain that higher levels of agricultural production will put pressures on the environment. Soil degradation, deforestation, and depleted water resources will cause farmers to open up new land to farming, which will reinforce further environmental damage. Conservation farming techniques that are locally appropriate must be employed alongside modern technology to ensure sustainable productivity increases.

The use of technology to improve yields without greatly increasing land under cultivation will be essential. Improved seeds created through modern plant breeding techniques, including biotechnology, promise drought resistance, improved yields, and efficient use

[27] Counterpart International, "Vietnam's Investment in Agriculture and Higher Education in Agricultural Sciences, Agricultural Extension," December 9, 2008.

of fertilizer. Where conservation farming has been adopted, farmers are seeing increased yields. The challenge of disseminating information on conservation practices and modern farming technologies to smallholders suggests the need, as argued elsewhere in this report, for a revitalization of extension services, teaching, and research.

Integrate Approaches to Help Women in the Design of Development Programs. Women bear the burden of food production in many parts of the world in addition to their traditional roles of running a household and raising children, yet they are the most difficult to reach with assistance programs. The Chicago Council on Global Affairs reports that women and girls provide 80% of farm labor in Africa, and 40% in South Asia. In Africa, where the HIV/AIDS pandemic has left many women as heads of households, they receive less than 10% of small farm credit and own just 1% of the land according to a 2007 World Bank study.

Experience has also shown that when women are the focus, development payoffs are greater. A 2000 IFPRI study found that when women in Africa were given the same level of training, experience, and farm inputs as men, their agricultural yields increased by 22%. Other studies have found that women are more likely to reinvest their incomes for the benefit of their families. Women who have access to education have children who enjoy higher levels of nutrition and decreased mortality rates. According to a recent Organization on Economic Cooperation and Development report, national per capita income increases as women are educated.

Staff found that women in many countries, particularly in Africa, are largely responsible for food production. It is often the case that the husband has succumbed to AIDS or moved to a nearby city in search of income. The wife must try to eke out a living off a plot of land that is often too small to produce a surplus and for which she has tenuous title. She does so while having to tend to a number of children, some of whom are orphans of other family members. To reach a market, she or her children must walk several miles on dirt paths or poor roads. Transporting produce to a market can often take up most of the day. It is little wonder that women do not have discretionary time to attend meetings with a periodically visiting extension agent.

Because of the many and varied demands made on women's time and the potential development benefits that accrue from raising their incomes, U.S. development programs and projects should integrate a women's focus into their design and implementation.

Don't Allow Agriculture to Become an Extractive Industry. During the data collection process of this study, staff encountered reports [28] of foreign companies and governments that were responding to increased food prices by accessing large tracts of land in developing countries. In most cases, the developed country is wealthy, but does not have a sufficient natural resource base to ensure its food security. For example, reports surfaced in November that

[28] "Daewoo to Cultivate Madagascar Land for Free," *Financial Times*, November 19, 2008; "The Breadbasket of South Korea: Madagascar," *Time.com*, November 23, 2008; "Land Leased to Secure Crops for South Korea," *Financial Times*, November 18, 2008; "World News: U.N. Food Chief Warns on Buying Farms," *Wall Street Journal*, September 10, 2008; "Foreigners Snap Up African Farmland," *The Vancouver Sun*, November 3, 2008.

Daewoo Logistics of South Korea was negotiating with Madagascar for a 99-year lease of an extensive tract of the country's arable land for corn production. Persian Gulf states are also making similar forays into other African countries. According to the reports, the food would be exported home. In such cases, farming may come to resemble an extractive industry in which the host country sees very little benefits. Extractive industries are often vulnerable to corruption if the agreements between governments and foreign companies lack transparency.[29]

In some reported cases, the developing country is providing land for free or at little cost with the hope that the foreign operation will make improvements in infrastructure and technology transfer. However, there was little indication that such provisions were being written into agreements and that host countries were relying on hope and good faith. Other reports indicated that local workers would not be used; the exporter company would bring in its own labor, thereby removing employment as a potential benefit to the host country. Further, having all commodities exported to the home country does little to improve food security in the host country, and depending on the type of operation, could have negative environmental consequences.

Foreign direct investment (FDI) has long been a feature of international commerce. When managed well, it can provide powerful benefits for economic growth. This is as true of the agriculture sector as other parts of the economy. In fact, such operations could increase global food production thereby exerting downward pressure on high prices. However, host countries must exhibit great caution in entertaining these proposals. Negotiated agreements should provide benefits to both parties. They should ensure that operations are environmentally sound and do not result in massive deforestation. They must ensure transparency so that benefits accrue to the society at large and not just to the elite.

REGIONAL AND COUNTRY REVIEWS

The following discussion categorizes countries by the level of their food security, from countries that are considered chronically insecure and regularly require international food aid to those that are net exporters of food and have relatively small proportions of their populations that are considered hungry. A third category represents those with moderate to serious food insecurity and those that have witnessed a change in their condition over the past two decades.

SEVERE FOOD INSECURITY

Those countries that find themselves unable to feed their people generally are low-income countries that have not had the resources to invest in agriculture. Infrastructure and education systems are poor, and government policy has not helped to establish an environment conducive to agriculture or private sector development. Extension and research services are poor or non-functioning. Iron-

[29] Senate Foreign Relations Committee minority staff report, "The Petroleum and Poverty Paradox: Assessing U.S. and International Community Efforts to Fight the Resource Curse," October 2008.

ically, having a good natural resource base does not guarantee food security if farmers are unable to exploit it. Histories of civil conflict prevent farmers from producing and are exacerbated by periodic natural disasters such as droughts and flooding. Of the countries studied by staff, three fall into the category of food insecure with significant portions of their populations suffering from chronic hunger: Ethiopia, Zambia, and Laos.

Ethiopia

The food security status of Ethiopia could be characterized as chronically food insecure with unpredictable but regular crises. Generalized poverty across Ethiopia ranks this country as low as 8th poorest in the world. Despite significant resources, 80% of Ethiopians, some 61.6 million people, exist on less than $2 dollars a day. Food insecurity is especially critical in rural areas where 86% of the population resides. Economic insecurity dominates the urban centers where unemployment, inflation, and a lack of social safety nets put residents at risk. HIV/AIDS, malaria, tuberculosis, and a lack of clean water are constant threats to life.

Due to its chronic conditions, Ethiopia has been the subject of multiple studies of the agriculture sector and food security of its population. One such study, the 2004 USAID report entitled Breaking the Cycle of Food Crises: Famine Prevention in Ethiopia, stated that Ethiopia's economic conditions are not primarily the result of drought but rather "the weak economic policies of the country over a sustained period—characterized by low rates of investment in economic growth and agriculture by both government and the commercial private sector."

The dominant national source of income is coffee exports. Additional efforts to secure niche commercial crops, such as flowers (roses) have been successful due to a free-trade environment surrounding the investment and trade of this product. The agricultural sector in Ethiopia accounts for 85% of total employment, 46% of GDP, and 92% of total export earnings. The vast majority of employment is on small-holder subsistence farms that generate insufficient income to feed a family.

According to a report by Save the Children, the current food crisis has been brought about, in large part, by rising food prices—Ethiopia's food consumer price index was 91.7% higher in July 2008 compared to July 2007. In some parts of Ethiopia, maize prices have increased 266% since 2005 with a 177% increase from February to April 2008. Neighboring Kenya saw prices rise by only 44%.

Ethiopia is chronically food insecure primarily because of poor government policy and extremely limited capacity. The 2008 Global Hunger Index ranks Ethiopia near the bottom of the scale at 31, significantly worse than most other countries in sub-Saharan Africa. Because the 2008 food crisis was not reflected in this ranking, Ethiopia's food situation is likely worse than its score indicates. Nearly 10 million people of a population of 77 million are at risk of starvation every year. In 2005 (the latest national measure) 46% of the population were considered malnourished (down from 63% in 1995). Malnutrition is a chronic problem with more than half of children under five years stunted, while 47% are underweight

(UNICEF, 2004). The minimum caloric intake cost is more than the income of nearly 50% of Ethiopians.

A critical policy deficit is land tenure/land use policy, which currently precludes any ownership while maintaining unverifiable and undocumented leasing arrangements. There are a host of specific additional causes of food insecurity that result from the policy and incapacity, including: the lack of national, regional, or local infrastructure—from roads to electrification to storage and transfer, to education and training. There are also obvious proximate environmental or climatic impediments to improved agricultural outputs and nourishment of the population in many regions of the country, primarily recurrent and more frequent drought conditions as well as untimely and unpredictable rainfall, deforestation, and land degradation. The lack of attention to infrastructure and meager resources devoted to the sector have resulted in an over-tasked and overcrowded university system and limited development of effective agriculture research centers, extension services, and even competent seed multiplication facilities. Compounding these factors is an ongoing turbulence in the political realm with internal conflict across the political spectrum, and persistent, perceived external threats from north, west, and south that absorb inordinate human and economic resources.

Additional critical elements of the Ethiopian situation include dramatic land and soil degradation; pastoralist livelihood challenges due to land policy, climatic conditions, and conflict; an under-resourced and underutilized livestock industry that leads the continent in size despite poor infrastructure and support; a significant unrealized dairy potential; and an unexploited fertilizer industry. Finance for rural enterprise, especially agriculture, is hampered by limited resources and high risk due to climatic conditions and poor agriculture inputs. Subsistence farmers and wage labor households depend on self-finance and community-based/cooperative resources. This population has limited if any collateral due to ill-defined property and land use rights. Faced with high cost inputs and uncertainty over the harvest, most farmers opt for low-cost inputs that produce lower yields.

Ethiopia is not food insecure because it is short of natural resources but because of a common array of persistent human inhibitors compounding natural challenges. Pro-agricultural development and rural growth rhetoric abound but are insufficient to reverse the negative impact of bad policy and the lack of political will by the government to fundamentally restructure problematic economic development plans.

Ethiopia and its nearly 80 million people are confronted with profound risk and the donor community is itself confronted with a profound dilemma—aid or strong medicine? Should chronic Ethiopian under-development be addressed by transformative policy or should the status quo of the last 30 years be sustained by continued alignment of humanitarian and development assistance with ad hoc incrementalism preferred by the regime?

There is substantial agreement that the existing landholding system is the prime obstacle to effective agricultural sector development and thus Ethiopia's economic growth. Granted there are many visible deficiencies in one of the poorest countries on earth,

beginning with a dearth of financial resources for infrastructure, education, science, extension services, markets, and so on. But, the landholding rules, norms, and associated policy are so uncertain for the farmer, the trader, the banker, the marketer, the exporter, or even the government, that credit is a rare and risky venture that stands between chronic hunger and any growth. A recently completed pilot project sponsored by USAID—ELTAP—has shown that credible land registration can and does dramatically improve farmer and agriculture sector opportunities for growth. Despite such promise the program, like many before it, is struggling for national and donor resources to continue while also at risk of political ambivalence given other perceived priorities.

The confluence of chronic factors noted above, compounded by the global food crisis and mounting internal political and external tensions, suggests that sustaining current development approaches will only prolong the inevitable and growing humanitarian catastrophe. Broadening poverty, competition for resources among the growing population, and chronic food insecurity due to erratic natural and man-made influences portend a troubling outcome. Ethiopian history has shown that policies that do not adequately address the most basic needs of the people will eventually lead to a new government much as it did under the Emperor and Marxist Dergue regimes. Donor country humanitarian and development response has been consistent in meeting most of Ethiopia's hunger through massive food aid, even in good harvest years, however it has been at the expense of broad, coherent development based on effective principles such as land use policy that recognizes and releases the value of land. Donors in Ethiopia accept this as the price for working there; as they have accepted the government's insistence, on pain of expulsion, that cholera, which is quite common in Ethiopia, not be called by its name but by the euphemism Acute Watery Diarrhea (AWD) in order to avoid embarrassment.

On the other hand, the government of Ethiopia could seize the initiative of this looming catastrophe and join its many international donors as partners in a broad review of policy from which to establish a fundamentally new national approach to achieve agricultural sector and general economic development. The principles have been well studied, both in Ethiopia and in much of the developing world. Though not all lessons are relevant, such principles could transform long-term development policy that would allow Ethiopians to realize the vast potential of existing natural resources that could set their country on a path to broad economic growth and food security. There are reasons for setbacks but there is no rationale for failure to capitalize on available resources and means. Recommendations for specific actions include: reforms to ensure the security of land tenure; a dual approach of strengthening both small-scale and commercial farmers; address regulatory and tax environments for agriculture; improve infrastructure, including roads, irrigation, storage, and markets; strengthen research and extension services; and build national fertilizer production.

Zambia

When considering Zambia's natural resource base, there is no reason why the country should be food insecure. It has ample ara-

ble land and a relatively small population. Roughly 40% of southern Africa's water resources flow through its territory. Yet, large areas of Zambia are chronically food insecure. Zambia has the potential to produce food surpluses, but it is hampered by: poor infrastructure; inadequate and/or expensive inputs; poor access to markets; lack of crop and livelihood diversification; poor research and extension services; government policies that distort the market; inadequate investments in agriculture by the Zambian government and international donors; and, a distrust of both science and free markets. An increase in droughts and flooding can tip the scale from moderate levels of food insecurity to a more severe situation requiring international food aid.

Zambia is a lower income country of approximately 12 million people with one of the world's highest adult HIV/AIDS prevalence rates (17%). The country is the most urbanized in Sub-Saharan Africa, with 40%–50% living in cities and towns. About 80% of the rural population and 34% of the urban population live in poverty. Historically, copper mining has been the driving force of economic development, which has contributed to the high urbanization rate. When copper prices are high, government policies focus on the mining sector and agriculture is short-changed. However, 80% of the population is dependent on agriculture, which provides 70% of the labor force, and comprises 22% of GDP, according to the FAO.

According to IFPRI's 2008 Global Hunger Index, Zambia scores 29.2—hungrier than Sub-Sahara Africa's average of 23. This score represents a significant number of undernourished people: 46% of the population during 2002 to 2004. The under-five mortality rate is 18%, with 23% of children under five underweight. Zambia shows no progress from its score of 29.1 in 1990. Hunger in Zambia is due to both food deficits and high poverty rates that prevent the poor from having access to food, or to a diversified diet.

According to various sources, at least 10% of Zambian households have no productive assets or income. Many of these are female-headed households affected by the AIDS epidemic. It is estimated that at least 445,000 people will need food aid prior to the March 2009 harvest. With a high poverty rate, especially in rural areas where most households are small-scale farmers, many more are vulnerable to low productivity and disruptions in output from flooding and droughts.

An estimated 600,000 small holders farm between ½ hectare and 20 hectares of land; about 100,000 medium-scale holders farm between 20 and 60 hectares; and some 1500 commercial enterprises farm more than 60 hectares. Michigan State University (MSU) estimates that the mean farm size is 3.27 hectares. While the commercial sector is considered productive, small and medium holders produce significantly less per hectare even though these households produce the majority of the country's staple crop of maize. Small holders suffer from a lack of access to inputs, such as fertilizer, seed, and irrigation systems. They often employ farming techniques that are ill-suited to their soil type or climatic conditions. A lack of secondary and tertiary roads makes it difficult to fully participate in farm markets. The World Food Program reported that while higher income Zambian families spend about 40% of their incomes on food, the poor can spend up to 80%.

The high HIV/AIDS prevalence rate of 17% contributes to food insecurity because of its impact in rural areas. There are reportedly about one million orphans[30] in Zambia, often living in households that have no breadwinner. Women are particularly burdened with caring for children and trying to eke out a living. Women farmers access extension services far less than men, largely because of their lack of discretionary time. A recent MSU study found that female-headed households have between 0.7 and 0.5 less hectares than male-headed households.

Extension services are government run and are considered ineffective. Extension agents are not fully engaged in the field, and agriculture school graduates prefer other lines of work. The university system does not emphasize extension services. The NGO community is providing these types of services in projects that advocate conservation farming and other techniques, but this does little to strengthen extension services in general, and may in fact be diverting extension agents to their employ. It was generally conceded that NGOs pay better than government positions. An innovative USAID-supported program works with a private seed company to serve small holders by using agents to sell their products and to provide information on higher yield farming techniques.

Approximately 94% of land is held in a customary tenure system in which land is occupied by some 73 tribes, and land is distributed according to the dicta of tribal chiefs, senior chiefs, and paramount chiefs. Six percent of land is statutorily held by the government. Gaining access to the use of tribal land does not seem to be difficult, whether the request is from a small holder or relocating commercial farmers from Zimbabwe. However, the lack of real title may hinder improvements necessary for transitioning from subsistence to commercial output, or to the access of financing for those improvements.

Zambia is food insecure not because of its natural resource base or climatic conditions—even though it has been hit with recent droughts and floods in some regions—but because of a lack of investment in agriculture productivity and infrastructure, and because of policies that distort the market. All of these conditions are fixable, and Zambia could become a major exporter and food source for southern Africa.

Laos

The Lao People's Democratic Republic, as it is formally known, is a poor, landlocked, mountainous, sparsely populated (pop: six million), agricultural Communist country that, perhaps surprisingly, is self-sufficient in rice and most other foods. The least advanced of the three countries that once made up French Indochina, the average per capita income is about $2 a day. Ethnic Lao, Buddhists who make up about half the population, live mostly in the lowland areas and dominate culture and politics. They fare better than minority groups, including Hmong and others, who live in tribal villages in the mountains under primitive conditions, many still practicing slash-and-burn agriculture (called in development

[30] According to UNICEF, there were a total of 1.2 million orphans in Zambia in 2005, of which 710,000 resulted from HIV/AIDS deaths. UNAIDS reports about 600,000 orphans are due to HIV/AIDS in 2008.

circles shifting cultivation or swidden agriculture). The number of ethnic groups ranges, depending on who is counting, from 49 to 200. Hydroelectric power exported from dams on tributaries to the Mekong River, tourism (especially to the old royal capital Luang Prabang, an unspoiled gem), and mining are major sources of foreign exchange. There is little manufacturing or other industry: agriculture, dominated by subsistence rice farming, accounts for 41% of the economy and 78% of the workforce.

Laos scores 20.6 on the Global Health Index, virtually the same as Sudan (20.5). In the World Development Report, it is classified as an "agriculture-based" country along with much of sub-Saharan Africa, rather than "transforming" like most other East Asian countries. According to a WFP assessment in 2006, "Every second child below 5 years in the rural areas is chronically malnourished [and is stunted as a result]. This is alarmingly high and remains as high as it was ten years ago," despite steady growth in the economy and agricultural output over that period. "Two-thirds of the rural households have a livelihood portfolio that puts them at risk of becoming food insecure." The food insecure tend to be unskilled laborers or farmers who seldom fish and hunt. They are poor, isolated, illiterate minorities who suffer from bad sanitary conditions. Thus, though Laos is self-sufficient in rice production overall (a few deficits persist in some areas, especially the north), and the government says rice production has increased 75% since the introduction of Chinese-style market economic reforms in 1986, food security in Laos is better viewed through the prism of nutrition than through agricultural production.

Aside from asset wealth (the well-off are more secure than the poor), occupation seems to be an important determinant: non-farmers who engage in petty trading, skilled labor, or salaried jobs do best. Farmers and unskilled workers do worst. Farmers who supplement their crops with fishing and hunting often fare better, because lack of fat, oils, and micronutrients is a major cause of malnutrition, according to the WFP. Sanitation and health care are also important for the many people who live in minority villages that may be a day's walk or more from a road, and from there another day's journey to a town with a clinic. The government has tried to cluster villages near roads in order to deliver services and provide market access, with mixed success. Many upland residents rely heavily on so-called non-timber forest products (NTFP) to supplement their diet (eg., mushrooms, ferns, game) and their incomes (rattan, agarwood). However, overpopulation, access restrictions to protect watershed, mining, and commercial clearing for rubber plantations are limiting these traditional resources. The WFP study also found that a successful government anti-opium drive had cut the income from many farmers who grew the crop, and that tons of unexploded ordnance (UXO) left over from the Indochina War renders much potential farm and forage land inaccessible. In addition, malnutrition is affected by ignorance of good nutrition practices by upland dwellers, and by some traditional practices followed by nursing mothers.

Lowland farmers have small plots (1.8 hectares) in traditional rice paddy areas, while the upland minorities rely on less productive upland or dry rice production from similarly sized plots (1.4).

Likewise, a majority of lowland farmers have effective title to their land, but few of the mountain people do. An Asian Development Bank (ADB) study says "access to rice is the single most important factor" for the welfare of rural Laotians, and that the most severe deficiencies occur in the mountainous northern and eastern regions.

According to the WFP, only 4% of total land area is cultivated. Rice covers more than 80% of the farmed area, and nearly all of it (90%) is rainfed. The government [31] says the current 100,000 hectares of irrigated land could be expanded to up to 300,000, but it is too costly. Upland rice (grown in dry fields, not in flooded paddies) accounts for 15% of total rice area. Irrigated fields account for about 14% of total production, and have the highest yield, 4.4 tons per hectare, compared to 3.4 tons for rainfed lowland rice and 1.8 tons for upland rice. The government is trying to end the practice of shifting agriculture in the mountains (bans began in the 1980s, but a target of total elimination by 2000 was not met; new targets are in place), and total land area used for shifting cultivation dropped from 119,000 hectares in 2001 to 29,400 hectares in 2005. An Asian Development Bank survey of 95 villages in the poorest districts found that resettlement programs connected with anti-swidden efforts often led to lower rice production and population pressure on scarce resources.

Another unusual problem for Laos is the vast amount of unexploded ordnance that limits access to land. In part because the Ho Chi Minh trail ran along eastern Laos, an estimated two million tons of bombs were dropped on the country. Many of these were 'cluster munitions,' and an estimated 30% of the bomblets failed to explode. This renders much of the land in Laos dangerous or impossible for farming or foraging. There is so much metal that a cottage industry in scrap collection has arisen, and there are at least 16 registered smelters that turn the metal into construction re-bars. The metal collection process contributes to a persistently high casualty rate. The UN says UXO in Laos still claims about 300 casualties a year. UXO clearance is expensive ($2,000–$3,000 per hectare) and very time-consuming. Construction companies that want to build a dam pay private firms millions to clear the area. Figures on how much arable or forest land is off limits as a result were hard to pin down, but many of those interviewed said it was a significant amount. A World Bank report mentions in passing that UXO is one of the major causes of poverty "still affecting half the country's territory."

The most food insecure people in Laos are the remote hill people who live lifestyles not far removed from hunter-gatherer societies of the 19th century. The second most vulnerable are the many subsistence farmers who do not have enough cash to buy the extra food they need. But for all vulnerable groups, the quality of the diet, and other food habits, contribute at least as much as food quantity to their poor nutrition. Rural Laotians are not in the habit of eating meat, and their diet is very low in vegetable fats and oils. Many rely on wild fish for their protein. Lack of micronutrients is

[31] Staff was told by respected international organizations active in Laos that all agricultural data must be considered provisional because no reliable agricultural census had been conducted in many years. One is now underway.

a problem. Breast-feeding/weaning practices and food taboos for nursing mothers are also a concern: many women believe they should not eat after giving birth—sometime for as long as three months. Pre-natal and maternal care is also virtually non-existent for hill people: staff was told of a big need for de-worming of mothers and infants. Simply increasing consumption will not be enough to solve the malnutrition problem. By the same token, much can be done to reduce malnutrition rates regardless of the food supply.

What is needed, according to the consensus of those interviewed, is a comprehensive nutrition strategy that would cover health care and counseling, nutrition education to effect long-term changes in eating habits and food choices, food supplements, crop diversification into more nutritive food like peanuts (for oil) and "kitchen garden" vegetables, rural development, and better rural livelihoods through access to markets. Improving crop productivity through better varieties, more inputs, and better technology to close what one expert called "a big productivity gap" would be complementary. The problem is that until now the Lao government's capacity to carry out such a strategy is negligible. "Most of the staff in health care have very little training, and there is no training in nutrition," said one international expert. Getting the proper interventions out to dispersed and remote mountain villages would be a challenge even for a government far more competent than that of Laos.

The government of Laos, prodded by the WFP's alarming malnutrition revelations, on Dec. 1, 2008, issued a National Nutrition Policy 2008–2020, prepared in consultation with the FAO and others, and is now developing a strategy and action plan to implement it. The U.S. could support elements of the plan, the first ever by the Lao government to combat high malnutrition rates, either with specific programs and inputs, or simply by improving government capacity through training of nurses, nutrition counselors, etc. The U.S. could also invest directly in agriculture and food distribution, either through specific projects on plant and livestock breeding, irrigation and fertilizer, pest and disease control, rural development, training and deployment of extension agents, etc., or by increasing the government's capacity to do so. The World Bank and other donors often seek to improve capacity through budget support, which is not U.S. policy; the U.S. could do it in other ways to signal approval of the Lao government's important decision to make nutrition a keystone of its development policies.

FOOD SECURE

Several characteristics distinguish food secure countries. They have a long history of investing in the agricultural sector and have sound extension services. They have solid education systems and good research facilities. Perhaps most significantly, they have been able to join the ranks of middle-income countries. Even so, some can also have significant portions of their populations that are insecure. Of the countries visited by staff, both South Africa and Costa Rica have achieved impressive hunger index scores on a par with other major food producing countries. Both have democratic governments with active civil society.

South Africa

South Africa is an upper middle income country with highly developed infrastructure, trade relations, university system, and research facilities. Its market economy is based on services, manufacturing, and mining; agriculture comprises just 8% of the workforce and contributes 3.8% to GDP. Despite having first-world characteristics, nearly half of its 49 million citizens live in conditions more common in developing countries. Of these nearly 25 million people, ¾ of households lack access to electricity and running water. Half do not receive a primary school education, and more than a third of children suffer from chronic malnutrition, according to the World Bank.

According to IFPRI's 2008 Global Hunger Index, South Africa scores an impressive 6.9, much better than the Sub-Saharan African average of 23 points (with some individual countries topping 40). The score reflects the impact of the first-world half of South Africa's dual nature. The country is considered food secure even with significant portions of the population suffering from hunger and malnutrition. It obtains its food secure status because it does not have a food deficit, producing a surplus and exporting food products to the African continent and Europe. This is largely due to the legacy of a robust commercial farming sector, from which few black South Africans benefitted—particularly during the apartheid regime.

Rising food prices are considered one of the primary drivers of South Africa's rising inflation rate. The country is experiencing the highest food inflation rate in five years—from July 2007 to July 2008 the increase in the Consumer Price Index for Food was 17.8%.

According to the South Africa Department of Agriculture, at least 2 million households (or approximately 12 million people) are vulnerable and the number may be higher as a result of the food price spikes that occurred in late 2007 and 2008. Other reliable sources in the country estimate that half the country's population is food insecure. In a 2005 report, the FAO estimated that 14 million, or one-third of the total population, is vulnerable to food shortages. Most of the hungry live in rural areas, although urban poverty has been a persistent problem. The rural hungry are generally small land holders (approximately 3 million subsistence farmers, according to the Department of Agriculture) with insufficient land and little access to capital, technology, and agriculture inputs necessary to raise farm yield. It is estimated that, on average, poor South Africans spend more than 30% of their incomes on food, according to the South African National Agricultural Marketing Council. With a high HIV/AIDS prevalence rate ranging between 16% and 18%, women become head of households, often caring for a number of orphaned children. In good times, women carry a heavy burden; in bad times, women and their dependents can be pushed from poor but resilient into extreme poverty.

Despite not having huge tracts of highly arable land and ample water resources, South Africa produces a food surplus that allows it to both export and donate food. There are many factors that have contributed to this situation. An investment in commercial farming combined with the adoption of technology to overcome productivity issues, strong infrastructure, robust research and extension, and

fully developed markets demonstrate that deficits in a natural resource base can be overcome through knowledge transfer, scientific research, and government policies that do not distort market forces.

The South African government has shown a commitment to development in general—building 3 million houses, and increasing water and electricity coverage to 80% of the country, with the size of the black middle class tripling. The FAO attributes food insecurity to the level of poverty in the country and the lack of infrastructure in deep rural areas. Those who suffer from food insecurity are at risk because they lack income to access food.

Costa Rica

Costa Rica is a middle-income country with a strong democratic history. Compared with its Central American neighbors, Costa Rica has achieved a high standard of living and has not yet faced serious food security problems.

The percentage of undernourished Costa Ricans was approximately 5% in 2002–2004, compared to 19% for all of Central America, according to FAO data. Costa Rica has seen a steady decrease in the percentage of undernourished people from 8% in 1980 to its current level of approximately 5%.

Costa Rica imports all its wheat, yellow corn, and soybeans, primarily from the United States. Imports of rice and beans, two important staples in the diet of the Costa Rican population, have increased over time, as local production has declined. However, Costa Rica is an exporter of a wide variety of food products, including fresh fruits, coffee, sugar, beef, and dairy products.

The agricultural sector is a mixture of large commercial farming operations (bananas and pineapples, for instance, where large multinational companies play a leading role) and a robust small-scale farming sector (the coffee and dairy sectors, for example, are made up of thousands of small producers). Small-scale farmers in different sectors are able to benefit from domestic and international trade. There are several organizations established by law that regulate the relationship between the producers, processors, and exporters. Instituto del Café de Costa Rica (ICAFE) in the coffee sector, Liga Agricola Industrial de la Caña de Azucar (LAICA) in sugar, Corporación Arrocera Nacional (CONARROZ) in rice, Corporación Bananera Nacional (CORBANA) in bananas, are examples of those organizations which, according to producers, are beneficial to the various sectors involved.

The government is promoting commercial liberalization and food security at the same time. It has been working on the process of commercial openness for 20 years. At the same time, starting this year, the government has the National Plan for Food Production encompassing a number of investments in the sector. Commercial liberalization and food security are not regarded as opposing goals.

Costa Rica has the largest volume of investment in science and technology compared with the rest of Central America. However, the amount of money invested as a percentage of GDP is still low. Moreover, most of the research is not integrated into a coordinated plan with an underlying strategic vision. It is scattered in a number of institutions without coordination. GM crops are not explicitly

prohibited but the matter is still being debated. Officials from the Ministry of Agriculture told staff that they personally supported biotechnology, but many in the government oppose their position.

For a couple of years now the agricultural extension service has been using an agro-alimentary food chain approach. It is organized from a national directorate at the Ministry of Agriculture with a network of regional offices and extension services for free to small and medium-size agricultural producers. Compared with the rest of Central America, Costa Rica is the country with the most public resources allocated to agricultural extension programs.

The government's development plans are not biased necessarily toward urban or rural areas. The Government has strong, traditional ties to agriculture and celebrates farming as symbolic of Costa Rican provincial life. Just as Costa Rica is interested in maintaining rice production through government support and promotes agricultural exports, it also promotes free trade zones for business growth in professional services, added value industrial production (from car parts to microchips), and medical supplies. This type of commercial activity tends to be located in urbanized San Jose. Thus, Costa Rican economic policy addresses both urban and rural areas.

Costa Rica did not impose restrictions on the import or export of food at the height of the food crisis in mid-2008. Although domestic food security concerns are gaining strength, most recommendations focus on increasing domestic production and productivity. A National Food Plan, proposed by the government on May 7, 2008, aims to increase local grains production and provide direct cash transfers to the most vulnerable members of Costa Rican society. There have been virtually no calls for export restrictions as a means of dealing with rising food prices. The Minister of Agriculture expressed strong support for imports to meet Costa Rica's food security needs, although he plans to promote efforts to increase local production of rice and beans.

In order to protect local producers, Costa Rica does maintain long-standing import restrictions (in the form of higher import tariffs) on meats, rice, potatoes, and onions. Tariff restrictions on meats will be eliminated for the most part upon CAFTA's entry into force, although some tariffs will be eliminated gradually. Until the recent world food price crisis, the Costa Rican rice sector was generally assumed to be a candidate for downsizing; now the Costa Rican government is actively looking for ways to stimulate the sector and ensure its survival under more open market conditions.

Although farmers usually complain about the lack of adequate infrastructure, especially in the rural areas, the existing infrastructure has allowed the country to become a diversified agricultural products exporter. Fresh produce and other basic foodstuffs are available year round throughout the country. Farmers markets operate in most of the larger towns of the country.

Costa Rica farms roughly 10% of its land area. The Country has made an effort to increase irrigation available to farmers primarily in the province of Guanacaste, a particularly dry area during the dry season, which extends from December to May, and sometimes into June or July in this area of the country. Many producers now enjoy the ability to plant crops during the dry season in this region

as a result of the irrigation projects. The rest of the country is not as affected by reduced water availability during the dry season. However, as the population grows, especially in the central valley and in the coastal regions, water scarcity and pollution are becoming very important issues. The government of Costa Rica is increasingly concerned about increased competition for water resources between urban users and the agricultural sector.

Costa Rica and other parts of the Central America and the Caribbean region could see a change in rainfall patterns and growing seasons arising from climate change. For example, researchers from the National Oceanic and Atmospheric Administration (NOAA) and the University of Massachusetts Amherst Climate System Research Center estimate that many areas of Costa Rica will become warmer and drier as a result of climate change, particularly in high elevation Pacific slopes and the Caribbean lowlands. Elsewhere in the Caribbean region, the Caribbean Community Climate Change Centre (CCCCC) estimates that a 2° Centigrade rise in temperature would result in a 10–14% reduction in the region's yield of rice, a 14–19% drop in beans, and up to a 22% drop in maize production.

Officials of the Inter-American Institute for Cooperation on Agriculture (IICA) told staff that they expect to see an increase in support subsidies for poor farmers as a response to the recent spike in food prices, with the aim of building infrastructure and capacity. IICA proposed increased efforts to train farmers, give them credit, and improve agricultural infrastructure. Likewise, the Minister of Agriculture said that the credit crisis is preventing farmers from obtaining small loans.

Farmers can readily obtain seeds, fertilizers, and other agricultural inputs in Costa Rica, either locally produced or imported, depending on the product. The commercial sector is fairly developed and there are different suppliers of agricultural inputs throughout the country.

Adoption of new varieties is fairly rapid in the country once a new variety is approved. However, this varies by sector, as some sectors are more traditional than others. Also, some sectors are primarily export oriented (pineapples for instance) and respond faster to international market requirements.

MODERATELY FOOD INSECURE

Within this category are countries that are improving their food security status, and those that are stagnating or are likely to see degraded food security in the future unless interventions are made.

Improving Countries. Some countries have made great strides in the past two decades to improve their food security. IFPRI identified ten countries that have improved their hunger index since 1990, some by significant measures—Kuwait, Peru, Syria, Turkey, Mexico, Egypt, Vietnam, Thailand, Brazil, and Iran. Staff confirmed the improvements made by Vietnam, and identified Indonesia as also having improved its agricultural productivity.

Indonesia

Indonesia's Global Hunger Index moved from 16 in 1990 to 11.3 in 2008.[32] The food security situation in Indonesia is volatile with respect to the global increases in agricultural commodity prices. Food is largely available to all Indonesians throughout the 17000-plus, island archipelaego. Lack of access is the main problem contributing to food insecurity in some poor areas. Root causes are the lack of productive assets, poor natural resources, underdevelopment of the local economy, and a fragile environment. Many rural areas throughout the archipelago, especially those outside of the Bali-Java region, are food insecure largely due to the lack of roads and related infrastructure.[33] Rural communities in eastern Indonesia suffer from food insecurity because of a series of challenges including chronic drought, limited access to financial capital and markets, public policies that discourage production, farmers' limited technical skills, and poor storage. In addition, farmers are unable to obtain information on farming techniques, and households have very limited knowledge of sound nutritional practices. Extension services have faltered over the years, but strengthening them is a government objective.

Indonesia is among those countries where protests over higher food prices have erupted. According to the FAO, "even small fluctuations in the price of food can tip the balance between poverty and grinding hunger." The urban and landless poor are affected by price increases. In addition to the urban poor, large numbers of rice farmers have small plots that are insufficient to produce a surplus. These farmers are net buyers of rice. Not only do they not benefit from high rice prices, but more of their incomes are consumed in purchasing the staple.

Rice is the main staple for Indonesians and its production is a politically sensitive issue. Increases in the price of rice have significantly affected about half of the population with food taking up about 30% of the household budget. The country is still struggling to cope with the aftermath of the December 2004 tsunami that killed more than 150,000 people, displaced more than half a million people, and destroyed schools, roads, and water and sanitation systems. Those areas are considered to be in "acute food and livelihood crisis." Indonesia is located at the center of the volatile geographic region known as the Ring of Fire. Earthquakes, volcanoes, typhoons, tsunamis, and other natural disasters devastate communities frequently, requiring significant and costly recovery.

Self-sufficiency in food production is a top national security priority of Indonesian leaders, developed with a domestic political emphasis. The government has privileged rice production over the rest of agriculture in its growth programs. Large levels of soybean imports, for example, are a point of "lost face" given the rising nationalism and maturing of democracy in the country. Indonesian leaders have not yet reconciled the political importance of food self-sufficiency with the economic benefits to the population of relying on free market principles.

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[32] IFPRI 2008 Global Hunger Index.
[33] Indonesia Economic Program Assessment (IEPA), 2008.

In November 2008, President Susilo Bambang Yudhoyono said, "Indonesia must struggle to reach food self-sufficiency . . . we have our own good resources with which to develop the agriculture sector. Fortunately, this year we have reached self-sufficiency in rice and corn. This year's increase in rice production is the greatest during the last 12 years." The President added that Indonesia's rice production was expected to reach 60 million tons this year, up 5.46%, from 57 tons last year.[34] Indonesia imports significant amounts of soybeans, wheat, and corn, and is a major exporter of palm oil.

In 2008, a group of experts met in Jakarta to discuss the causes of the price hikes and proposed action steps that Indonesia should implement to provide affordable food supplies for its citizens. Entitled "Food Inflation: Challenges and Policy Prescriptions," the experts predicted that high food prices were here to stay in the foreseeable future. Rice distribution schemes were seen to provide relief to the poor in the short term; however, the experts agreed there were other, better solutions to control high food prices going forward. These involved incentives to increase the quality and quantity of supply, including improvements to irrigation infrastructure and farming technologies and schemes to help farmers meet international standards for food exports. If farmers directly benefited from high rice prices and were given incentives to increase production, this extra supply would put the brakes on higher prices, the experts said. It was notable, the experts warned, that increased production was not occurring in countries that imposed export restrictions to keep domestic food supplies low.[35]

"Reused rice," that is rice scavenged from restaurant and street side stalls, rinsed off and sold at a discount, is a feature of some poor people's diets. There is also an active market for used cooking oil, which is filtered and bleached and resold. While local rice prices have yet to hit the record levels seen in the world market, they are still high enough to support significant switching from rice to wheat-based noodles as local flour millers report a steady demand for noodles. Fortified wheat noodles are sold in individual serving packages with seasonings, and are a common substitute for protein, often eaten at breakfast instead of rice. High wheat prices are also encouraging producers to look at technology to fortify noodles and to reduce production costs.

The Indonesian government is emphasizing an increase in national production capacity for rice, maize, soybeans, sugar cane, and beef. The main agenda for revitalizing agriculture is redesigning the agricultural marketing system, developing farmer's cooperatives, developing infrastructure, enhancing agricultural science and technology implementation, and facilitating loan access for farmers.[36] While government officials attempt to develop policies conducive to a healthy agriculture sector, many challenges exist, bureaucracy and corruption among them.

Although Indonesia imports transgenic goods, advances in Indonesian approval, use, or regulation of biotech products are not a

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[34] The Jakarta Post, "Food self-reliance national priority: SBY", November 13, 2008.
[35] Van Zorge Report, "Food inflation: Challenges and policy prescriptions", Vol. X, No. 10–11, June 17, 2008.
[36] *Agriculture Statistics,* Ministry of Agriculture, 2007.

priority for the government. The government issued a regulation for Biosafety of Transgenic Products, but implementation is not a priority. Given the global price runs for a number of commodities, however, Indonesia appears to be at the point where serious consideration of biotechnology could begin. This is especially true within the research community, though less clear within government regulatory bodies.

The country has seen large-scale growth in higher education, now operating 89 public institutions serving more than 2 million students. There is a wide variety of vocational and specialty programs. Several universities have agricultural science programs at the equivalent of the Master's level in the U.S. system. More common are vocational programs that focus on agricultural practice and technology. Government financing for higher education was 2.4% of GDP in 2007. Beginning in 2009, the plan is to allocate at least 20% of the country's budget to education.

Despite the number of schools offering vocational or other agricultural science degrees, staff found that problems exist with the quality of faculty, availability of essential laboratories and equipment, and funding for research. The faculty is insular with little engagement in research and scholarship being conducted elsewhere. It was suggested to staff that post-doctoral education is needed to reverse this trend.

According to some estimates, deforestation has contributed to Indonesia being the third largest emitter of greenhouse gases after the United States and China.[37] Forty precent of the forests that existed in 1950 were cleared in the following 50 years, with forest cover falling from 162 million hectares to 98 million. Since 1996, deforestation appears to have increased to an average of 2 million hectares per year. Climate change may also pose challenges to Indonesia's agricultural productivity. A 2007 World Bank report projected that global warming could increase temperatures, shorten the rainy season, intensify rainfall, and reduce soil fertility by 2% to 8%.[38]

Outside of the Bali-Java region, the lack of adequate infrastructure among the archipelago poses hurdles to development. Much of the population has no access to roads, electricity, or adequate health infrastructure.

Vietnam

Vietnam is a country of contradictions on the issue of food security. It is the world's second largest exporter of rice; however, large segments of the population do not have access to food of nutritional substance. Vietnam made an impressive shift in its Global Hunger Index from 23.9 in 1990 to 12.6 in 2008,[39] but the proportion of malnourished is 35.5%, according to IFPRI. The nutritional status of Vietnam's population has improved significantly during the last two decades, and severe child malnutrition has been reduced. However, challenges remain and the malnutrition rate of children is

[37] Kyodo News, "Deforestation Puts Indonesia as 3rd Largest Greenhouse Gas Emitter," March 24, 2008.
[38] The World Bank, "Climate Change Threatens Food Security, Health and Coastal Communities in Indonesia," June 4, 2007.
[39] IFPRI 2008 Global Hunger Index.

still very high. According to data from the national survey conducted in 2004, one-third of Vietnamese children were moderately or severely underweight. More than 4 million children under age five were malnourished at the end of 2007.[40] While food is available in Vietnam, it is not affordable to many, nor is food of sufficient nutritional value available to all of the population. A reduction in the purchasing power of many Vietnamese households, especially poorer ones, presents a substantial risk that households that had risen above the poverty line will fall back below it. In this context, poorer women and children are particularly at risk since higher food prices can worsen their already precarious nutrition status.[41]

The government's focus on raising rice yield neglects support for a more diversified range of crops that could significantly affect malnutrition. In October of 2008, Deputy Prime Minister Nguyen Sinh Hung told a working session on food security of concerned government agencies that to ensure food security, the main targets are rice quality and yield, rather than expanding rice acreage. Despite progress made, the government acknowledges existing challenges. In May of 2008, Vietnam's Communist Party Executive Committee issued a resolution and an action plan on agriculture and rural development that identified several shortcomings. Those deficits include problems in sustaining agricultural growth, mobilizing resources, and transferring of science and technology. The government noted the slow process of restructuring the rural economy and labor structure.

During 2006–2007, it is estimated that agriculture, including forestry and fishing, contributed about 3.7% to the country's GDP growth rate. The rural population accounts for 73% of the total population. The rural workforce directly involved in agriculture, forestry, and fishing accounts for 54% of the total workforce nationwide. However, the movement of the rural workforce to urban areas is accelerating, and the rural workforce is consequently aging.

Most of the country's commercial rice production occurs in the Mekong Delta, but climate change threatens to remove this area as a center of productivity.[42] Farmers in the Mekong Delta grow three rice crops a year and produce more than half of Vietnam's paddy output, in addition to supplying more than 90% of the grain for trading.[43] Drying and storage deficiencies have negative effects on quality and profitability. Vietnam is the second among the top five nations in the world facing dangers caused by climate change and rising sea water. The Red River and Mekong Deltas are projected to suffer the heaviest consequences. Presently, unexpected storms, floods, and droughts have become fiercer, while coastal low land areas are on the verge of being submerged, and the Mekong Delta, the country's rice granary, is being intruded by water. Vietnam's

[40] Counterpart International, "Vietnam's Investment in Agriculture and Higher Education in Agricultural Sciences, Agricultural Extension," December 9, 2008.

[41] United Nations, "Food Prices, Vulnerability and Food Security in Vietnam," Hanoi, October 2008.

[42] The Ministry of Agriculture and Rural Development reports that the portions of commercial rice in different regions varies, about 25–30% in the Red River delta, 8–10% in the northern mountainous area, 15–20% in the central and central highland areas, 55–60% in the southeast region and 70–75% in the Mekong Delta.

[43] Reuters, "Vietnam's Rice Exports Total 4.1 Million Tons." September 22, 2008.

Ministry of Natural Resources and Environment is devising a national program to cope with climate change and rising sea water in Vietnam, to be submitted to the National Assembly for action.[44]

Vietnam has turned to technology to help it cope with changing climatic conditions and to improve yield. It is putting a major emphasis on biotechnological research including GM, education and training, new crop development, food safety, and processing. The government of Vietnam spends up to $10 million annually on biotechnology-related research. Preparations are underway for biotech field trials involving corn, soybeans, and cotton.[45] Moving from a centrally planned to a market economy, Vietnam is rushing to absorb as much education and training as possible. The lack of proficiency in English by a majority of the population, including high school and college-age students, is an overwhelming challenge.

New seed varieties are developed by government institutes, and are distributed through the agricultural extension network. The Agricultural Extension Center at the national level covers 40% of the seed cost for a farmer's first planting with new seed. In the late 1980s, the Vietnamese government reversed its disastrous collectivization system, allocating land to farmers on long leases. There are now ten million small farm households averaging 0.6 hectares, and 100,000 larger farms averaging six hectares. With the majority of households having only 0.6 hectares, Vietnam's land tenure may limit productivity.

The university system is weak. A shortage of professors means that universities function at only 60% of capacity and the quality of education is affected. With two-thirds of the nation's population under the age of 20, Vietnam is struggling to cope with the growing demand for higher education. There are eight agricultural colleges, four managed by the Ministry of Education and four by the Ministry of Agriculture. University education is heavily theoretical and not practically oriented. Extension agents are not well-trained in coaching, facilitation, communication, or market perspectives. The U.S. National Academies, in conjunction with The Vietnam Education Foundation, recently completed a review of education in the agricultural sciences and recommended that reforms be implemented to address teaching methods, and curriculum, increase funding, integrate research and extension with teaching, and encourage greater cooperation between universities and government agricultural institutions.[46]

One of the best ways for the U.S. to promote food security in Vietnam would be to emphasize programs to provide English instruction and English curriculum development within the country. Vietnamese government and agriculture officials, as well as leaders in higher education are ravenous for an elevated level of higher education projects between the two countries, including Vietnamese students studying in the U.S., American universities setting up operations in Vietnam, and other projects.

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[44] "Natural Disaster Mitigation Newsletter," Vol. 6, June 2008, Ministry of Culture and Information, Hanoi.

[45] SFRC staff interview with Dr. Nguyen Quoc Vong, Director, Center for International Development, Hanoi University of Agriculture.

[46] The National Academies, "Observations on the Current Status of Education in the Agricultural Sciences in Vietnam," January 2007.

Moderately Food Insecure. Three countries—The Philippines, Guatemala, and Uganda—were found to be moderately food secure, with many of the characteristics of the severely insecure, but with global hunger indices that indicate less severe rates of malnutrition. Some of the three show evidence of making the necessary investments in agriculture.

The Philippines

The Philippines is a lower middle-income country with abundant natural resources and a well-educated population, but with a history of poor governance and political instability that has left the economy far below its potential. "The Philippines is a rich country with a poor population," one U.S. embassy official said. Although the Philippines is a major producer and exporter of bananas, pineapple, and coconut (the former two from large commercial plantations, the latter from smallholders), it is the world's largest importer of rice, the main staple food. Imports meet 10% of domestic rice demand. Philippine panic buying is cited by many sources as the major driver in the unprecedented spike in rice prices, which more than doubled the cost of rice between January and May 2008, to $923 per ton. Agriculture accounts for more than one-third of employment, but less than 20% of GDP. The industrial (15% of the economy) and service (50%) sectors are concentrated largely in Manila and a few other big cities, with little spillover to rural areas; mining and fishing are also important sectors.

The Philippines scores 14 on the Global Hunger Index, a figure that puts it well behind many of its East Asian neighbors, including China, Thailand, Malaysia, and Indonesia (but far better than Africa or South Asia). This year it was passed by Vietnam (12.6), an historically poorer country that is developing far faster. Poverty, population, and policy are among the keys to understanding the Philippines' food security situation. Despite pockets of prosperity in places like Manila and Cebu, 42% of the population lives on less than $2 a day, and remittances by overseas workers provide key support to the economy. The Philippines' population of 90 million is growing at 2.01% annually (down from a recent 2.36% rate), one of the fastest in Asia, adding another two million mouths to feed each year. Economists say the government's over-emphasis on promoting rice production inhibits agricultural diversification into more profitable crops where the Philippines may enjoy a relative advantage, and its policy of requiring that all rice be imported by the National Food Authority helps keep domestic rice prices well above world prices and raises the cost of food for the poor.

According to the latest comprehensive survey from the Philippine National Nutrition Council, seven out of 10 households are food insecure, more than a quarter of pre-schoolers were underweight, 4.3 million families were living below the poverty line, and more than half of those were below subsistence level. An estimated 70% of the country's poor live in rural areas, with a particularly acute situation on the Autonomous Region of Muslim Mindanao, the large southern island that has been wracked for years by conflict and is home to a third of the total rural poor. Most of the provinces on Mindanao are listed as vulnerable, very vulnerable, or very, very vulnerable to food insecurity by the government. Nationwide, many

of the food insecure are landless rural workers, others are small holder farmers and fishermen. (Along the coasts, 80% of fishermen's households are below the poverty line.) As part of a long-standing land reform program, plots are limited to five hectares, and the average farm is only 1.2 hectares. Property rights are a problem. The urban poor are primarily slum dwellers and low-skill workers in Manila (pop: 12 million) and a few other cities. Because the poor spend such a large proportion of their money on food, they are particularly vulnerable to rising food prices. A recent analysis by the Asian Development Bank projected that a 10% rise in food costs in the Philippines would increase the number of "absolutely poor" by 2.7 million persons.

Arable farmland comprises 40% of the land area. However, its high population means the country has only a quarter of the arable land per capita of nearby Thailand. Of the cropped land, about 32% is for rice, or about four million hectares (vs. 9.8 million hectares in Thailand). Officially, a bit less than half of the irrigable land is irrigated, but Department of Agriculture officials said many of the irrigation systems are in disrepair. Despite having rich soil, the Philippine archipelago suffers several disadvantages which make it difficult to produce bumper crops of rice. One, many of the islands are mountainous, particularly on the eastern side. Two, the country sits squarely in the Pacific typhoon belt, and gets hit by 15–20 typhoons a year. Three, it lacks large rivers with deltas suitable for large-scale rice production, as in Thailand, Vietnam, or Burma.

Fertilizer is subsidized by the government, but critics say the program benefits mostly larger farmers and is an unwise use of scarce funds. It is also subject to abuse: during the staff visit, the headlines and TV news were dominated by revelations of an alleged $15 million "fertilizer scam" in which government officials are accused of funneling money to political cronies, charging 1000% over market rates, and general mismanagement (eg, delivering orchid fertilizer to rice farms). The government also offers advanced-variety seeds at half price to farmers (including hybrid seeds). Again, economists say this is wasteful because farmers have an economic incentive on their own to buy better seeds that would produce better yields, and many in fact do so on their own. One study suggests targeting the subsidies to areas where farmers are not widely using advanced varieties. The government, through the NFA, sets a floor price for rice, and also markets some rice to consumers at subsidized prices.

Philippine farmers took good advantage of initial Green Revolution varieties and techniques, and they benefit from one of the largest agricultural research systems in Asia. GMO technology is well-regulated and more or less accepted. The government is promoting more use of hybrid seeds, which can dramatically increase yields (but have to be repurchased every year): the barrier appears to be difficulty in finding the right hybrids to match up with different regional conditions rather than cost or institutional resistance by farmers. The International Rice Research Institute (IRRI) is located 40 miles south of Manila, on the campus of the University of the Philippines Los Baos (UPLB), the nation's premier agricultural research university. However, government officials and outside experts agreed that extension services are weak because,

under a 1990s decentralization program, responsibility was devolved to the provincial level. The federal Department of Agriculture used to have 50,000 extension workers. Now it has none, and is estimated that the provincial total may not be half that.

Since the period immediately after World War II, when it was the second richest country in Asia (after Japan), the Philippines has been plagued by a dysfunctional governing system, largely dominated by land-holding elites and traditional political families (the current president, Gloria Macapagal-Arroyo, is the daughter of a former president), that is prone to corruption, cronyism, populism, and political gamesmanship (during the staff visit, lawmakers launched their fourth annual impeachment motion against the president). While other East Asian countries were experiencing economic takeoff in the last part of the 20th century, the Philippine scene was characterized by the 21-year reign of the kleptocratic dictator Marcos and the perennially coup-threatened Cory Aquino presidency. Despite widespread English fluency, an affinity for Americans and American culture, and lavish attention by U.S. administrations over the years, the Philippines has managed to squander one of its most important assets, its human capital: nearly 10% of its citizens live and work abroad because they are unable to find meaningful employment at home.

Governance, corruption, too-slow economic growth, and too-fast population growth are the backdrop for the Philippines' food security problems, which are directly related to income inequality, poverty, and particularly, persistent rural poverty. Clearly, major reforms are needed in the rice import policy, but donor attempts to effect policy reform have a notoriously unhappy history. Equally clearly, some targeted interventions could help: support to strengthen the research base to help achieve the needed productivity gains as well as strategies to rebuild extension services; infrastructure assistance aimed at small scale irrigation that will help smaller farmers and promote crop diversification and rural road improvement; other rural development efforts to tackle directly the rural poverty issue and increased fisheries productivity to address the acute poverty of that population. USAID points out that promoting good governance in implementing such interventions should also be a priority.

Guatemala

Guatemala is a country of adequate arable land mass and other necessary attributes to prosper agriculturally. Agricultural industries associated with the production of products such as sugar, coffee, bananas, and latex, among others, are highly organized and largely employ modern technology on large land holdings. However, Guatemala increasingly must rely on imports for staple food crops such as maize and beans which, in the event of global food shortages, could expose a country where a majority of the rural population is considered malnourished, to economic and political turmoil.

Agricultural growth in Guatemala is stagnant. There are a number of factors that contribute to this condition. Guatemala is a country affected by social tension among its population, with an urban population base that largely traces its roots to European set-

tlement and an indigenous populations that is rural-based. These tensions were manifest in armed conflicts as late as 1996 when peace agreements were signed.

The current government under President Alvaro Colom, the first to be elected by carrying the rural vote, has instituted a number of well intentioned programs to improve the well being of rural residents. Included in the programs are direct cash transfers and food donations to citizens of the poorest communities, as well as rural development and extension initiatives under the newly created ProRural, an effort established by President Colom and directly managed by his wife, first lady Sandra Torres, to oversee food security and rural development issues. Because these are executive branch initiatives, there is concern about their continuity and funding especially if the next president does not enjoy strong rural support. It is also unclear how these programs will mesh with legislatively created bodies such as the Ministry of Agriculture, Livestock and Food (MAGA). A civil service in the Guatemalan government is virtually non-existent, further hampering long-term development and continuity.

Guatemala ranks first in Latin America and sixth worldwide in chronic malnutrition. Malnutrition affects 36% of women of childbearing age and newborns and nearly 50% of children under five are chronically malnourished. The pattern of overall malnutrition is one of social and economic inequality and follows that of extreme poverty with rates higher among indigenous populations and those in rural areas. The most important crops, in regard to food security, are corn, beans, and rice. According to the FAO, 75% of Guatemalan households only consume five products: corn tortillas, beans, eggs, tomatoes, and sweet bread. The Agriculture, Resources, and Environmental Institute of the Unisersidad de Rafael Landivar (IARNA) established that the contribution of basic grains to per capita intake of energy and protein is quite high: 37.7% and 36.5% for corn, 9.5% and 22.9% for beans.

The basic grain market is not sufficiently developed; significant gaps exist such as inadequate networks for storage, drying, sale, and distribution. Specifically, small-scale producers do not fully participate in the market. Their participation is limited to selling products during the harvest. These producers tend to sell their crops to intermediaries who pay low prices, particularly when products are available, like at harvest time. Gaps in the market can be defined as the conditions that hamper adequate competition. Some of the deficiencies identified by staff include: the lack of adequate market information for farmers; unequal access to capital; and the inability of small farmers to influence prices.

There are areas of the country that are more food insecure than others. The departments of Totonicapan, San Marcos, Alta Verapaz, Quiche, Huehuetenango, and Peten have the highest risk indices and food and nutrition insecurity rates, according to SESAN, the Food and Nutritional Security Secretariat. One of the main reasons for the difference in food insecurity is the high level of poverty that characterizes these departments. Thirty-nine (39) of the 41 municipalities classified by SEGEPLAN, Executive Secretariat for Planning and Programs, as having indices that surpass 90% poverty are located in these six departments. It is also worth

noting that of the 30 municipalities that SEGEPLAN identifies as having the highest rates of exclusion or marginalization from full participation in society, 24 are located in these six departments.

There are regions in Guatemala in which the incidence of overall malnutrition is higher, such as the northwestern region, in which 31% of children under five weigh less than normal, while in the Metropolitan region, the percentage goes down to 15%. Additionally, the mother's level of education is a determining factor in reducing overall malnutrition. The prevalence of malnutrition in children whose mothers have had no schooling is 30% compared to about 9% in children whose mothers have had at least secondary education.

According to the views of the Inter-American Institute for Cooperation on Agriculture, the most critical aspect of the issue of food security in Guatemala is the lack of food that is sufficiently nutritious, potable water, and adequate sanitation. Food access and availability are also problems. Excess or insufficient rain, damage to infrastructure, and crop losses from pests and diseases are factors that also contribute to food insecurity in certain sectors of the population.

About 25% of Guatemala's land is suitable for agriculture. Forest cover, which constitutes 43% of the national territory, is rapidly disappearing. The FAO estimates that the country has lost 50% of the forests that existed in 1950. According to estimates from the National Forest Institute (INAB), Guatemala loses about 73,000 hectares per year to deforestation, of which nearly 29,000 hectares are found within protected areas. The annual deforestation rate is estimated to be 1.71%.

Under the structural adjustment policy applied in the 1980s, the government sold off or leased part of the infrastructure of the National Agricultural Marketing Institute (INDECA), which had the capacity to store 54,841 MT. As a result, the country has no capacity to store surpluses or strategic reserves. The country needs to restore this lost capacity. The Ministry of Agriculture and Livestock (MAGA) is currently executing the Post-harvest Program, which focuses on promoting the use of and constructing metal silos. National demand for silos exceeds 1.1 million units; to date, only 10% have been built.

In addition to storage capacity, other critical needs are road construction, and road improvements for the movement of food into food deficient areas and agricultural inputs to increase food production. Guatemala does not maintain railroad capacity, and it is estimated that 1700 km of roads must be paved and 300 km of new roads must be built in order to optimize existing potential. Passable all-weather roads are important to link production to markets.

The pattern of land holding also poses problems. In Guatemala 2% of the population owns 72% of all the agricultural land. According to the 2004 agricultural/livestock census, 45% of farms measures less than 0.7 hectares, and constituted 3.2% of the national territory; 46.8% were farms measuring between 0.7 and 7 hectares, and occupied 18.6% of the national territory, while 8% of total farms that had areas larger than 7 hectares covered 78.2% of the national territory.

Government plans and projects focus mainly on rural areas, especially the 45 municipalities with the highest levels of poverty and food insecurity. The MAGA and the ProRural are responsible for implementing actions aimed at boosting agricultural production as a means of improving food security and generating surpluses for the market. To do this, it provides small producers with fertilizers, seeds, tools, and some infrastructure, such as mini-irrigation systems and greenhouses. This is complemented with credit to lease land through FONTIERRA (Fondo de Tierras), Guatemala's land registration office, which in turn provides technical assistance. Implementation of the government's food security policy is supported by the Ministry of Public Health and Social Welfare (MSPAS). The measures adopted by the government to address the rise in prices and the problem of food insecurity can be summed up as the reduction of tariffs on food imports, subsidies on agricultural inputs, distribution of agricultural inputs, agreements on intergovernmental cooperation in the production of staple grains, and food distribution programs.

In recent years, budget resources for agriculture have averaged about 3% of the total budget. It should be pointed out, however, that rural areas benefit from additional resources provided by other agencies for specific projects aimed at helping populations highly vulnerable to malnutrition or those that live in territories subject to environmental disasters.

At present, the public sector does not have a well-defined strategy for research and extension services. Some non-governmental organizations and specific projects have technical assistance and training components, but the limited scale has not caused any visible effect on productivity. Current Guatemalan extension services are under the authority of MAGA, although the government has begun to put in place extension capacity through the newly established ProRural. ProRural plans to implement a version of development models published in studies sponsored by the Universidad Rafael Landviar's IARNA. Those studies suggest that an agricultural growth rate of 5% per year in the highlands would have significant effects on poverty reduction, and that the production of horticultural crops would be best to achieve these growth rates. ProRural has added a number of food crop foci and plans to maintain extension services in 125 prioritized municipalities. As ProRural is funded by residual resources from the annual budget, it is unclear if long-term sustainability of these services will be ensured through actual budget authority.

Agricultural research conducted by the Guatemalan government is done through the Institute of Agricultural Science and Technology (ICTA), but it has been downsized in recent years. Ninety precent of its budget is used to pay for salaries and basic services. Assistance to organized producer groups and individual farmers has been drastically reduced. Technical training is practically nonexistent in most production areas.

Though some research activities are being conducted by private agricultural entities, the technical and professional service sector for agriculture is not well developed. There are very few firms that offer technical consulting services and diagnostic laboratories, due in part, to underdeveloped markets, and substandard business and

agriculture education provided by technological schools. This is beginning to change as private agricultural enterprises are increasing their demand for specialized services.

Guatemala has four agricultural science schools including the Universidad de San Carlos, the Universidad de Rafael Landivar, the Universidad del Valle de Guatemala, and the Universidad Rural. The Universidad de San Carlos is public and offers free education, while the others are private. The first three universities have research institutes with modern laboratories and agricultural land, though funding is severely limited.

The capacity of Guatemala to take advantage of technological advances such as genetically modified seed is limited. The Law for Environmental Protection and Improvement and the Law to Establish the Ministry of the Environment and Natural Resources broadly govern and regulate transgenic products. Additionally, under the National Food and Nutritional Security Policy, a central principle is that of precaution. Under this principle, an importer of food products must prove and guarantee its safety. Guatemala is a signatory party to the Cartagena Protocol on Biosafety, a supplement to the Convention on Biological Diversity that aims to regulate the handling of live modified organisms and stipulates a nation's ability to limit importation of these products.

Uganda

The overall food security picture in Uganda is good and improving but persistent poor policy and incoherent planning could reverse this trend. Nature has afforded Uganda a buffer that is not sustainable over the long-term given a 3.3% population growth rate and continued reliance on small-scale farming with limited modern farm inputs. Although there is additional arable land to be cultivated, it is insufficient to meet future requirements if current policies and practices continue. Traditional inheritance of land primarily to men, and by generations of subdivision, combined with poor farming methods will quickly dissipate the advantage through soil degradation and decreasing yield. Uganda's per capita productivity in agriculture has already been trending negatively and has returned Uganda to being a net importer of food. Hunger in Uganda is due to marginalized and conflict areas afflicted with natural disasters but is also beginning to show the shortcomings of government policy and priorities given a burgeoning population and unpredictable commodities and financial markets.

About 80% of the workforce is employed by agriculture, of which some 20% work in commercial agriculture. While Uganda has fertile land, vast water resources, and a diversity of agriculture, livestock, and fishery resources, nearly 10% of its population suffers from extreme and chronic food insecurity, according to U.S. government sources. The International Food Policy Research Institute estimates that nearly 19% of the population is undernourished.

Uganda scores 17.1 on the Global Hunger Index, a figure far better than the 23 point average for sub-Saharan Africa, but one more difficult to interpret correctly given the sharp disparity between the north and south of the country. In the north, 61% live below the poverty line, while only 16% do in the south. The dichotomy between the two parts of the country is mainly due to conflict in the

north, but is exacerbated by government policies that treat each region differently. The southern half of the country, which has been conflict free for over 20 years, is able to produce sufficiently to assure food security. Though the agriculture sector is primarily small-scale and in need of reforms, there is a vibrant commercial sector as well. The central and southern population is far better off and more resilient to shocks from price fluctuations or environmental conditions than their counterparts in the north and northeast. Ugandan government policy still requires considerable improvement for maximizing growth, but the opportunity exists if the government does not continue to neglect rural development and the agriculture sector. There is a clear policy of dependence on donors, and an almost single-minded reliance on the private sector and market forces to drive agricultural development.

The north, on the other hand, has been viewed as an area of opposition to the government of President Museveni and has suffered from years of marginalization and neglect, as well as an ongoing guerilla type conflict with the Lord's Resistance Army (LRA). Only recently has the nearly 20-year conflict with the LRA abated. The LRA has been driven from the country, albeit not very far away, and hundreds of thousands of internally displaced are emptying from IDP camps to return home. The situation has improved markedly in the past two years. Nonetheless, though there is now government rhetoric toward development of this region, policy remains negligent of the need in the north. It is in fact the donor community and some private sector investors that are the main agents for growth in this region. The government remains aloof to the challenge and the opportunities to translate this recent peace into a national leap toward middle income status. Only through a political and budgetary commitment will the north contribute to the continued economic growth of Uganda. A chronic conflict zone due to high criminality still exists in the northeast Karamoja region—a pastoral and agro-pastoral mixed farming area with difficult climatic conditions. It is caught in a cycle of natural disasters (3 failed harvests in a row), conflict, and limited investment, all of which have perpetuated underdevelopment and chronic hunger for the million or so inhabitants.

Uganda's growing population will put pressure on the gains made in the last few years with regard to food security. At current rates of growth, its population will double by 2040 despite its low life expectancy rate of below 50 years. Relatively poor productivity and the rate of productivity per capita in agriculture are declining. There is significant potential for increased productivity given the natural advantages nature has provided Uganda. Staff was told that if farmers were to introduce one of several inputs such as irrigation, better fertilizer, or improved seeds, the country could easily quadruple current yield. According to the FAO, about 30% of Uganda is cultivable, but less than half is under cultivation, and only 0.1% of cultivated land is irrigated. Deforestation poses a serious problem. From 1990 to 2005, Uganda lost 25% of its woodland areas, largely from illegal logging and charcoal manufacturing. Currently, only 18.4% of the country is forested.

The agriculture sector is largely dependent on small- and medium-sized farmers with average national land holdings of 2.5 hec-

tares per farmer. Land tenure is stable, and while the average holding is larger than in most of the rest of Africa, continual subdivision with each generation will significantly affect the situation. Principal food crops are bananas, cereals, root crops, pulses, oil seeds, and fruits and vegetables. Fertilizer and seed are imported at great expense, thereby limiting their use by smallholder farmers. Livestock comprises 14% of agricultural GDP or 5% of total GDP, mostly owned by smallholders, but there has been no significant increase since 1990 in the population or productivity of the livestock sector. Road infrastructure is uneven throughout the country and limits the mobility of crops. In addition, as a landlocked country, Uganda has had to rely on Kenya and Tanzania for a seaward outlet.

Poverty eradication is a fundamental objective of Uganda's development strategy, in which the government has resolved to reduce the proportion of the population living in absolute poverty to 10% by 2017. The government has chosen to allow the market to drive the development of the agricultural sector, and it lags in necessary investments in the support structure, such as research and extension. The emphasis of the government's Poverty Eradication Action Plan (PEAP) of 1997 and the ensuing Plan for Modernization of Agriculture (PMA) of 2000 pursued the goal of "eradicating poverty by transforming subsistence agriculture to commercial agriculture. Improving the welfare of poor subsistence farmers will require that they re-orient their production towards the market." Government policy to rely almost exclusively on the private sector to drive development does not give it much leverage to direct how and where that development occurs. Government investments in agricultural inputs, such as irrigation, are designed to help the commercial sector produce high value crops for export. However, the government is taking actions in tax and incentives to promote a better environment for farm investment and productivity improvements. In addition, the government has tripled micro-finance and provided a recent massive injection of resources for transportation infrastructure, primarily road-building, that has an important positive effect on rural development.

The emphasis on the market and on reducing public sector activities is most evident in the realm of academia, research, and extension. The dilapidated nature of these three areas has led to a very low agriculture sector output growth of 0.4% in 2008 and years of declining per capita agricultural output. Existing government programs to disseminate better farming practices are under-resourced in both funding and personnel.

The National Agriculture Research Organization (NARO) is tasked with research on better crop and animal breeds so as to increase food and animal production in the country aimed at eradicating poverty. There are six National Agriculture Research Institutes and nine Zonal Research Facilities. The head of NARO recently appealed to the government to increase funding of the organization so as to enable researchers to come up with viable projects which will help improve household incomes. He has pointed out that the organization lacks enough staff and equipment to carry out effective research. Many donors and observers criticize the government for ignoring the agriculture sector, while other govern-

ment sectors, like security and administration, receive far more funding than the agriculture sector. With regard to genetically modified technology, Uganda's cabinet approved its first National Biotechnology and Biosafety Policy in April 2008, after eight years of deliberation. The policy provides objectives and guidelines for the promotion and regulation of biotechnology use in the country. But for the policy to be implemented, Parliament must pass a law to that effect.

The relatively new National Agricultural Advisory Services (NAADS) program of Uganda is an innovative public-private extension service delivery approach, with the goal of increasing market oriented agricultural production by empowering farmers to demand and control agricultural advisory services. It appears that the NAADS program is having substantial positive impacts, in areas where it is working, on the availability and quality of advisory services provided to farmers, promoting adoption of new crop and livestock enterprises as well as improving adoption and use of modern agricultural production technologies and practices. NAADS also appears to have promoted greater use of post-harvest technologies and commercial marketing of commodities, consistent with its mission to promote more commercially-oriented agriculture. Despite positive effects of NAADS on selected areas and agricultural products, wider adoption of improved production technologies and practices is still difficult.

The university system, led by Makerere University in Kampala, is limited by the lack of sufficient government resources to adequately address baccalaureate and post-graduate education and research to effectively produce increased numbers of graduates in academia and sciences. Uganda is able to retain its graduates due to the economic growth rate in the country. The universities do have agriculture science departments but are underfunded. One official pointed out the deficiencies by showing a university laboratory funded by outside donors and another completely in disrepair funded by the government.

CONCLUSION

The steep food price increases of the last two years have abated for the time being, but prices remain high in many parts of the world. The crisis that reached its zenith in 2008 demonstrated the fragility of global agriculture, and how quickly disruptions in one region can spread to other regions. The international community has failed to understand the necessity of maintaining investments in agriculture for both food production and poverty alleviation. People have been lulled into complacency by decades of low food prices without looking ahead to expected increases in population growth, urbanization, environmental degradation, energy supply disruptions, and demand for non-food crops. Farmers around the world will be asked to meet the demands created by these factors, even as they may be contending with a degrading agricultural environment that significantly depresses yields in some regions. Unless much greater effort is devoted to this problem, the world is likely to experience more frequent and intense food crises that increase migration, stimulate conflicts, intensify pandemics, and exacerbate poverty.

Solving hunger is both a moral and national security imperative. The United States should assume a leadership role in addressing hunger, poverty, and increasing global food production. To do so requires increased investments in agriculture and rural development, education, research, science, technology, and extension. As Senator Lugar has stated, "The United States cannot feed every person, lift every person out of poverty, cure every disease, or stop every conflict. But our power and status have conferred upon us a tremendous responsibility to humanity."

Senators Lugar and Casey have introduced legislation, the Global Food Security Act of 2009 that promotes these policy initiatives as centerpieces of U.S. foreign assistance policy. The bill is included as an appendix in this report.

APPENDICES

APPENDIX A.—ADDITIONAL RESOURCES

Asian Development Bank: *Soaring Food Prices: Response to the Crisis*, May 2008.

Chicago Council on Global Affairs: "Renewing American Leadership in the Fight Against Global Hunger and Poverty" White Paper, December 2008.

Food and Agriculture Organization: *The State of Food Insecurity in the World 2008*.

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Government Accountability Office: *International Food Security: Insufficient Efforts by Host Governments and Donors Threaten Progress to Halve Hunger in Sub-Saharan Africa by 2015*, May 2008.

International Food Policy Research Institute: *Global Hunger Index, The Challenge of Hunger 2008*, October 2008.

International Food Policy Research Institute: "Investing in Agriculture to Overcome the World Food Crisis and Reduce Poverty and Hunger," by Shenggen Fan and Mark W. Rosegrant, June 2008.

International Food Policy Research Institute: "International Agricultural Research for Food Security, Poverty Reduction, and the Environment: What to Expect from Scaling Up CGIAR Investments and 'Best Bet' Programs," by Joachim von Braun, Shennggen Fan, Ruth Meinzen-Dick, Mark W. Rosegrant, and Alejandro Nin Pratt, 2008.

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United States Agency for International Development: Securing the Future: A Strategy for Economic Growth, April 2008.

United States Department of Agriculture, Economic Research Service: *Food Security Assessment, 2007*, July 2008.

World Bank: *World Development Report 2008: Agriculture for Development*, 2007.

World Bank: *Development Outreach*, October 2008.

APPENDIX B.—GLOBAL FOOD SECURITY ACT OF 2009

S. 384 The Global Food Security Act of 2009. To authorize appropriations for fiscal years 2010 through 2014 to provide assistance to foreign countries to promote food security, to stimulate rural economies, and to improve emergency response to food crises, to amend the Foreign Assistance Act of 1961, and for other purposes.

For the entire bill, see: *http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:s384is.txt.pdf*

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