

IFPRI 2000-2001
International Food Policy Research Institute
2000-2001

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI) was established in 1975.

IFPRI's mission is to identify and analyze alternative national and international strategies and policies for meeting food needs of the developing world on a sustainable basis, with particular emphasis on low-income countries, poor people, and sound management of the natural resource base that supports agriculture; to make the results of its research available to all those in a position to use them; and to help strengthen institutions conducting research and applying research results in developing countries.

While the research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition, the factors involved are many and wide-ranging, requiring analysis of underlying processes and extending beyond a narrowly defined food sector. The Institute's research program reflects worldwide collaboration with governments and private and public institutions interested in increasing food production and improving the equity of its distribution. Research results are disseminated to policymakers, opinion formers, administrators, policy analysts, researchers, and others concerned with national and international food and agricultural policy.

IFPRI is one of 16 Future Harvest agricultural research centers and receives its principal funding from governments, private foundations, and international and regional organizations, most of whom are members of the Consultative Group on International Agricultural Research.

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MESSAGE

FROM THE CHAIR OF
THE BOARD OF TRUSTEES

THE YEAR 2000 had many highlights for IFPRI: the Institute completed important research on diverse topics such as malnutrition in Asia and around the world, market reform in Africa, microcredit, the transformation of rural Asia, and preliminary analysis of the new round of global agricultural trade negotiations. Last but not least, the Institute had its 25th anniversary.

As IFPRI embarks on its second quarter century, and as the world moves into a new millennium, many challenges lie ahead. Globalization has meant increased overall wealth, yet poverty and food insecurity stubbornly persist for too many of our fellow human beings, and inequality appears to be worsening. Many IFPRI studies offer important insights for addressing these problems. We know from past work by IFPRI that in poor countries, agricultural growth is essential for eradicating poverty, protecting the environment, and fostering overall economic development. We know a great deal about how to target food programs in ways that assure that needy people will benefit. We know how to address the problems of famine. And we know that public agricultural research can have enormous benefits to society as a whole and poor people in particular.

But new research is needed as well if we are to realize the dream of universal food security. How can we bring cutting edge technologies to bear for the benefit of food, agriculture, and the environment? Information and communications technologies have much to offer in the effort to foster food security. Similarly, new energy technologies hold great promise.

In this report, IFPRI researchers tackle the issues surrounding the potential contributions and pitfalls of new technological developments in another area, namely molecular biology.

The application of modern biotechnology to food and agriculture has been extremely controversial. Clearly, it holds great promise for poor farmers and consumers—the potential for more nutritious foods, drought- and pest-resistant crops that do not require costly purchased inputs, and foods that can deliver medicines. Yet consumer resistance in developed countries may derail the application of this technology to developing countries. And a policy environment is needed in developing countries that emphasizes poverty reduction, food security, and environmental protection, so that there is appropriate attention to biosafety and equitable agricultural development.

In 2001, IFPRI will continue to carry out research on all of these questions. We will also be looking at other critical issues, such as appropriate management of water resources, how to intensify agriculture in an environmentally sustainable manner in the less-favored areas where many poor people live, how to capture the benefits of high-value production and rural industrialization for poor people, what sorts of policies are needed to assure that globalization contributes to food security, and how to grapple with emerging and re-emerging health issues that impinge on poverty and malnutrition.

A highlight of 2001 will be the second international conference sponsored by IFPRI's 2020 Vision Initiative, to be held in Bonn, Germany. Organized in close cooperation with the German Federal Ministry for Economic Cooperation and Development, with the support of many public and private sponsors, the conference will focus on achieving sustainable food security by 2020. The conference will not just showcase the latest research and key food policy debates, but will seek to foster consensus around a set of priority actions that will help make the 2020 vision a reality. It is a very exciting time to be associated with IFPRI. We have a real chance to make a difference in the lives of hundreds of millions of people over the next few years.

Geoff Miller

Chair, IFPRI Board of Trustees

IT IS COMMON to speak of the haves and the have-nots. The material goods that we, the relatively well-off, have at our disposal are, of course, nearly endless, but one of our greatest luxuries is the freedom to make choices about our lives. These choices are obvious when it comes to our diets. Our grocery stores are filled to brimming with foods to choose from, and the quantity and quality of the food we eat are, for the most part, entirely up to us.

In poor countries, millions of people would like to feed their children more and healthier foods, but for them this is, at present, an empty wish. If money helps to buy choices, poverty certainly removes them. Poor people in poor countries are struggling to grow food in harsh environments, where drought is common, soils are depleted, and pests eat away a significant part of their yields. There is no money for irrigation, fertilizer, and pesticides.

IFPRI works to bring choices to the poor. It does so by analyzing the many economic and technological approaches to eliminating poverty. It examines, for example, whether agroecology, plant nutrient management, biotechnology, conventional technology, or some combination of these means will most improve farmer productivity and income without harming the environment. It also analyzes which economic environment best suits technology adoption and sustainable growth. The knowledge IFPRI contributes on these and other issues enables policymakers to make informed choices about helping the poor.

Recently, genetic engineering—the new tool of agricultural biotechnology—has become a hotly contested topic in the debate on how to grow more food and help people escape poverty. Some people in the developed countries fundamentally distrust genetically engineered foods and the corporations that produce them. As a matter of principle, they do not want to consume such foods, and they are pressing for labeling requirements that will help them avoid

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DIRECTOR GENERAL'S INTRODUCTION

these products. It is their choice. But in some cases, they also want to make choices for others and are working to turn back the technological clock altogether, never mind what benefits genetic modification of crops may offer to poor farmers and consumers in developing countries.

Agricultural biotechnology is no silver bullet. It alone will not solve the world's food problem—it is just one of many essential tools. Even if this tool can be brought fully to bear on developing more productive and nutritious crops for developing countries, it raises a host of complicated issues for those countries. This report presents essays on two such issues by IFPRI researchers.

As Sherman Robinson and Eugenio Díaz-Bonilla explain in their essay, a number of thorny trade issues surround agricultural biotechnology. What do international trade agreements say about whether countries can limit trade in GM crops and foods? What will it mean for the world trading system, and for developing countries in particular, if consumers in some developed countries refuse to buy GM foods while consumers in other countries are quite willing to buy them? Can the world accommodate separate trading channels for GM and non-GM foods, and at what costs?

Philip Pardey and his coauthors examine how intellectual property rights affect agricultural biotechnology. There is a perception that private corporations in the developed countries, by taking out patents and other forms of protection for their new GM crops and for related genetic materials, are shutting developing-country researchers out of the biotechnology revolution. This essay is a clear-eyed look at the legal and economic situation facing researchers in developing countries who wish to make use of new technologies. Although research on biotechnology accounts for only 2 percent of IFPRI's budget, IFPRI has chosen this subject for its annual report because of current heated debate and the potential repercussions developed-country policies can have on developing countries.

Research at IFPRI went well beyond biotechnology in 2000. Researchers completed, for example, important work on market reforms in Sub-Saharan Africa. This work offers vital lessons on how reforms can be extended to make markets work better for both poor farmers and poor consumers. Work continued apace on breeding micronutrients into staple food

crops in a CGIAR project for which IFPRI is the lead center.

This work promises to make staples like rice, wheat, and maize more nutritious, thereby leading to healthier lives for poor people who depend on these food staples. New studies were launched on the efficiency of water use and management in Indonesia and Viet Nam, which should result in valuable insights on how best to manage this scarce resource. And IFPRI researchers took a look at how the World Trade Organization and its rules will affect agriculture and food security in the developing countries. You will find details on these research projects and many others in this report. A fuller picture, past and present, appears on our website, www.ifpri.org.

This report makes it clear that researchers at IFPRI come at the fundamental problem of food insecurity from many different angles. This is because food insecurity is related not only to what farmers can produce and what people can afford to buy in the marketplace, but also to whether farmers have tenure over their land, who is favored by a country's tax policies, whether farmers gain their livelihoods from one crop or several, and whether poor people can borrow money in times of great need. What links all of these aspects of IFPRI work is the conviction that the poor and hungry in developing countries must be given the means to achieve healthy and productive lives—and that sound research and assessments about what works and what doesn't work is the essential first step. IFPRI research supports informed choices—the only good choices—for the poor, the public sector, the private sector, and civil society in general. In the end, we wish to see people the world over enjoy the power of informed choice, a power that we, the nonpoor, take for granted. For us this is essential for sustainable development.

Per Pinstrup-Andersen
Director General, IFPRI

Research at IFPRI and elsewhere supports an optimistic scenario for the 21st century—if agricultural productivity continues to grow as we at IFPRI project, the world will be able to feed itself. However, the assumption about continued productivity growth is crucial for this scenario to hold true. And as important as the amount of food grown is the question of who grows it. Smallholder farmers must participate in this productivity growth, or they will remain in poverty.

The biological Green Revolution, which relied on selective plant breeding, is now being superseded by a biochemical revolution, in which hardier, higher-yielding, and more nutritious crops are being developed through direct genetic modification (GM). These new GM technologies hold great promise, in combination with existing technologies, but they also bring with them a host of new questions and problems, including issues of food safety, environmental spillovers,

BIOTECHNOLOGY TWO PERSPECTIVES

The last agricultural revolution based on plant breeding is largely complete. True, some developing countries still stand to gain from further dissemination of “Green Revolution” technologies. And in some regions, such as Africa, there are still significant gains to be had from better production practices, including agroecological approaches, mechanization, and the increased use of agricultural chemicals. But existing technologies will not be enough to meet the increasing demand for food or the needs of smallholder farmers for more productivity and less risk.

intellectual property rights, and potential abuses of market power. IFPRI has increased its research on biotechnological issues in order to bring new knowledge into the global debate over this new food production method. Poor and hungry people in developing countries deserve, at the very least, that decisions affecting their lives be based on sound analysis, not solely on opinions and perceptions, and that their voices be heard in the decision making process.

The essays that follow deal with two of these contentious issues: international trade arrangements and intellectual property rights.

BIOTECHNOLOGY, TRADE, AND HUNGER

by Eugenio Díaz-Bonilla and Sherman Robinson

IN THE PAST two hundred years, there has been much concern with the Malthusian race between population growth and food supply. So far, food has won: increases in agricultural productivity have exceeded population growth. The last century saw three revolutions in agricultural technology—one based on mechanization, one on chemistry (leading to effective fertilizers and pesticides), and one on biology (the “Green Revolution”). For much of this period, agricultural productivity and output have grown rapidly and the relative price of food has declined.

Demographers predict that the world population will stabilize some time in the second half of the 21st century. And projections by IFPRI and others indicate that agricultural productivity can grow fast enough to sustain the world’s population, if new technologies are pursued. But there is more to feeding the world than making sure agricultural productivity stays ahead of population growth. International trade will also play a large role. Projections indicate that regions such as Africa will import a larger share of their food requirements in the future. At the same time, regions with a strong comparative advantage in agriculture will produce the additional food needed by the world.

But the new genetic modification (GM) technologies that many expect will help the world meet its food needs—not only through quantity, but nutritional quality as well—raise critical issues for international trade, including this key question: What will happen if pressure from consumers and environmentalists in the developed world leads to a new generation of trade restrictions, or to the segmentation of GM-food product markets, as appears to be happening in Europe and Japan?

An answer to this question requires a brief look at agricultural trade and involves both legal and economic analysis.

AGRICULTURE AND INTERNATIONAL TRADE

Currently, a large share of agricultural produce is consumed in the producing countries. This is true despite major grain and oilseed exports from countries such as the United States, Argentina, Canada, and Australia, and even after accounting for major export crops such as coffee, tea, cocoa, and sugar. However, IFPRI and others forecast a growing role for international agricultural trade in the 21st century.

There is likely to be increasing specialization in agricultural production, with more exports from countries that specialize in particular types of agriculture. Many developing countries may well hold a comparative advantage in producing high-value, labor-intensive specialty crops and horticulture, while land-abundant countries may be better at producing bulk goods such as wheat, maize, and soybeans. Research indicates that it is neither efficient nor environmentally sound for developing countries to seek food security by becoming self-sufficient in the production of food crops, particularly when such production involves inefficient, unsustainable methods on fragile lands.

GM technologies may facilitate increased specialization, while also boosting local food production and improving food security through the development of plant varieties specifically tailored to particular agro-ecological environments. Although the technologies have the potential to affect both traded and nontraded products, most applications to date have involved highly traded agricultural commodities.

To benefit from increases in agricultural productivity, developing countries have an enormous interest in being able to market their goods in developed countries. The world agricultural trading system is still dominated by developed countries with protected markets and domestic subsidy programs that ultimately distort international markets and potentially increase price volatility, to the detriment of developing countries.

Major goals of developing countries in the new round of World Trade Organization (WTO) trade talks should include opening markets in developed countries for their agricultural exports, including high-value, labor-intensive commodities, and reducing or, preferably, eliminating trade-distorting domestic policies in developed countries—especially export subsidies and price supports.

While these goals appear desirable, the picture is complicated by the possible impact of consumer and environmental concerns, particularly within developed countries, on the development of biotechnology. To consumers in high-income countries, the price-reduction benefits from biotechnology seem minor, while the unknown dangers are magnified by lack of information and mistrust in the ability of their governments to regulate the safety of the food supply.

A ban on GM products in developed countries, based on domestic consumer and environmental concerns, would not only affect market access but could also make it more difficult for developing countries to gain financial support from industrialized nations to conduct research and build human capital for biotechnology activities. Another possibility is that consumer and environmental concerns could spill over into developing countries and block or slow the development of biotechnology in those countries.

INTERNATIONAL LEGAL ISSUES

Any attempt to limit trade in GM products must be compatible with existing international legal agreements. There are only a few agreements (including environmental treaties) setting out the World Trade Organization legal framework regarding trade in GM products. These include the Sanitary and Phytosanitary (SPS) Agreement and the Agreement on Technical Barriers to Trade (TBT) of the WTO; and a multi-lateral environmental agreement, the Convention on Biological Diversity, particularly its Cartagena Protocol on Biosafety.

The question is what role these legal agreements may play in either keeping open or closing the opportunities offered by GM products. The international system is clearly under stress in this area, with growing tensions between the need for fairness in international trade and the need to respond to domestic concerns about food and environmental safety.

The basic issue continues to be market uncertainty about how consumers, mostly in developed countries, will react to GM foods.

The Sanitary and Phytosanitary Agreement, which concerns food safety and animal and plant health, says that WTO members have “the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health.” But those measures must be applied “only to the extent necessary to protect human, animal or plant life or health,” and must be “based on scientific principles.” The agreement also states that WTO members must “ensure that their SPS measures do not arbitrarily or unjustifiably discriminate between Members where identical or similar conditions prevail, including between their own territory and that of other Members,” and, furthermore, that those measures “shall not be applied in a manner which would constitute a disguised restriction on international trade.” In addition, the agreement suggests the use of international standards when possible.

The goal of all these regulations phrased in legal language is to allow countries to maintain standards of food safety but to prevent them from doing so in a way that unfairly discriminates against foreign suppliers.

The difficulty with GM products is that there are as yet no international food safety standards that really apply to them. The Codex Alimentarius defines international standards of food safety, but it does not yet specifically address GM products. Although the countries participating in the Codex are currently discussing adequate standards for GM products, a possible agreement is still some years away.

In the absence of agreed-upon international standards, some countries invoke the “precautionary principle” that allows them to set standards provisionally where relevant scientific evidence is lacking, although they are supposed to do the necessary research within a reasonable period of time. Other countries argue that the precautionary principle is being abused in order to protect less efficient domestic producers from foreign competition. Again, the challenge lies in adequately addressing both safety concerns and fairness in trade. Currently, a review of available scientific evidence indicates that GM foods have not been found to be unsafe—a double negative that highlights the difficulties of balancing consumer concerns, science, and international law. Proponents of GM products correctly argue that research has shown no health risks, while opponents argue that such research is not enough to prove that there are no such risks.

The basic issue continues to be market uncertainty about how consumers, mostly in developed countries, will react to GM foods. Regardless of the science, if consumers decide that they do not want to consume GM goods, markets will adjust to satisfy their demands. If these negative reactions persist, markets will adjust to different scenarios of prohibition, market segmentation, and product differentiation. These market adjustments in developed countries will have an impact on developing countries.

THE ECONOMICS OF GM TRADE

What will happen if consumers in developed countries refuse to consume GM commodities? Can world markets adjust to a complete segmentation of the markets for GM and non-GM commodities? Will developing countries still benefit from these new technologies if world markets are completely segmented and if, in addition, some developed countries refuse to adopt the new technologies at all?

To provide tentative answers to these questions, IFPRI has undertaken research jointly with the Danish Institute of Agriculture, Forestry, and Fisheries Economics. Using multi-country models of world trade focused on agriculture, the research analyzes the price, production, and trade consequences of changing consumer preferences regarding the use of genetically modified organisms in food production.

In the world model, the two primary GM crops, soybeans and maize, are specified as either GM or non-GM. This GM and non-GM split is maintained throughout the entire processing chain: GM livestock and GM food processing industries use only GM intermediate inputs; likewise, non-GM livestock and non-GM food processing industries use only non-GM intermediate inputs. The underlying assumptions in the model are that developing countries will adopt the new

technologies, to varying degrees, and that countries such as the United States will continue to use them, while Europe and Japan will not adopt them and will restrict their demand for such goods. The issue is which countries, if any, would benefit from the new technologies, to varying degrees, given the growing segmentation of the markets.

The empirical results indicate that global markets are able to adjust to this segregation in the sense that non-GM exports are diverted to the GM-intolerant regions, while GM-exports are diverted to the indifferent regions. Price differentials are significant but tempered by commodity arbitrage. In particular, in certain GM-favorable regions, the prices of the non-GM varieties also decline because of the high degree of substitutability between the GM and non-GM varieties in domestic use and increased production of non-GM varieties to supply GM-intolerant consumers.

The market results are analogous to what one would expect from increased consumer preferences in developed countries for organic foods. Such foods are more expensive to produce and command higher prices in the market.

There is a gap between prices for organic and other foods, which ultimately reflects cost differences in their production and distribution. Similarly, price differentials between GM and non-GM commodities will reflect their different costs of production and distribution, with consumers who are indif-

ferent benefiting from access to cheaper goods they find to be equivalent to non-GM goods, and producers benefiting from the higher productivity of GM crops.

An important finding of this empirical analysis is that the developing countries are also responsive to GM preference changes and redirect their trade flows among partners accordingly. Furthermore, given the existing bilateral trade patterns for these particular crops, the price wedges that arise in the developing countries mainly reflect productivity differences, not preference changes in the developed world. Overall, the regions most receptive to the productivity-enhancing technology gain most, including developing countries that adopt the new technologies.

Can world markets adjust to a complete segmentation of the markets for GM and non-GM commodities?

APPROPRIATE TECHNOLOGY IS A FIRST STEP IN FEEDING THE HUNGRY

The development of GM technology appears to hold great promise, with the potential to complement other, more traditional research methods as the new driving force for sustained agricultural productivity growth in the 21st century. Such agricultural productivity growth is crucial if the world is to produce enough food to provide for what is likely to be a stable but large world population in this century. At this point, the many problems and concerns surrounding the new GM technologies do not seem insurmountable, just very difficult.

A world with an adequate supply of food is clearly more desirable than a Malthusian world in which food is scarce, food prices are high and rising, and people are in conflict over scarcity. However, providing an adequate aggregate food supply will not eliminate malnutrition and hunger, now or in the future. To do that requires much more. To achieve food security for the entire world population, countries must work to reduce poverty and achieve a more equitable distribution of income—tasks that technology alone can only support, not achieve.

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ARE INTELLECTUAL PROPERTY RIGHTS STIFLING AGRICULTURAL BIOTECHNOLOGY IN DEVELOPING COUNTRIES?

by Philip G. Pardey, Brian D. Wright, and Carol Nottenburg

FOR MORE THAN a century, plant breeders in government-funded research centers have sought out crop varieties with characteristics that might help poor farmers in developing countries grow more food. They have painstakingly bred and cross-bred these varieties through generations to achieve a desirable mix of characteristics. At an accelerating pace in the 1960s and 1970s the work of these breeders changed the developing world—the higher-yielding varieties of wheat, rice, and other food staples they produced helped avert catastrophic famine in Asia—and their work continues to improve the lives and livelihoods of millions of people. Now, however, critics of the newest tool in the agricultural researchers’ toolbox—genetic engineering—argue that the new environment for agricultural research may leave farmers in the developing countries out in the cold.

Whereas government or international public institutions once performed most agricultural research, now private firms are taking the lead in applying the tools of genetic engineering to agriculture. When corporations (and increasingly public agencies too) develop new agricultural biotechnology products or processes or new crop varieties, they often seek legal rights over the intellectual property these innovations represent. Many are concerned that corporations’ efforts to protect their profits will isolate developing countries from the benefits of important innovations by blocking access to new developments by public and nonprofit researchers.

Corporations concentrate their research efforts on crops such as hybrid corn, soybean, canola, cotton, and some specialty horticultural products, which are grown for markets with high commercial value. The range of crops and production problems addressed by private research could well expand, but, as in the health area, private investment is mostly a complement, not a substitute, for continued public and other nonprofit research. Moreover, the development of a vast number of crops critical to food security throughout the developing world (such as cassava, yams, sweet potatoes, sorghum, millet), as well as crops that are globally grown (like rice, wheat, and maize), must continue to rely on public and nonprofit institutions as the principal source of genetic innovation. In developed economies, these types of institutions may increasingly find their access to essential new research inputs uncertain, unduly expensive, or even blocked altogether. This lack of access to intellectual property in the

developed countries is a source of aggravation and inefficiency but is not currently a serious threat to the well-being of their citizens.

Agricultural researchers in many developing countries are freer than one might think to make use of innovations protected in the developed countries.

For the poor in less-developed countries, access to new biotechnology might be much more crucial. They rely for sustenance on crops that are largely beyond the focus of the private research sector, and that have modest future commercial prospects. In addition, poor producers often face production problems different from those of commercial farmers in wealthier countries. Recent well-publicized “donations” of “intellectual property” by major multinational corporations to developing countries for certain non-commercial crops, while dramatizing the potential usefulness of biotechnology, have reinforced the impression that these countries lack access to modern technologies.

A closer look at the legal and economic realities facing agricultural researchers in developing countries reveals that these concerns are valid over the longer term but highly exaggerated as an immediate threat, thereby diverting attention away from more important problems.

THE RIGHTS TO RESEARCH

The principal public policy rationale for intellectual property rights (IPRs) is that they provide direct socially beneficial incentives to innovate as well as facilitate further innovation by mandating public disclosure of the patented technology. When individuals or organizations know that legal protection will enable them to recoup their research investments, they have a stronger incentive to pursue such innovations. Countries with strong traditions of innovation have long histories of IPRs—the United Kingdom awarded its first patent in 1449, and the authority for the U.S. patent system is enshrined in that country's Constitution ratified in 1788. In the absence of protection, disclosed new ideas and information are entirely in the public domain, and an innovator's attempts to recoup investment or to profit commercially from an innovation may fail because of imitation. Knowing this, prospective inventors may underinvest in R&D, or inventors may exploit their inventions in secret. In addition, by clarifying rights to new ideas, intellectual property rights help reduce the costs that would otherwise be required to determine ownership of rights.

An important, but perhaps under-appreciated aspect of most systems of intellectual property rights is their requirement that the inventors and researchers seeking these rights must disclose the new knowledge they have obtained. As new ideas are disseminated through publication, licensing, or other means, this information stimulates further rounds of innovation and technological advances.

Inherent in intellectual protection is a tension between the goal of providing incentives for innovation and the goal of allowing innovators to build upon one another's work. The broader the monopoly rights conferred, the larger the potential threat to the freedom to operate—the ability to practice or use an innovation. Owners of a technology may be unwilling to share or license it or willing only after costly negotiations, thus making it difficult for others to obtain essential tools for advancing their own research. Moreover, owners of technology may litigate against alleged infringers, so in practice, those who hope to use a protected technology must weigh the risk of litigation against the costs of obtaining licenses.

To further complicate matters, the modern methods used to develop new crop varieties depend on a wide range of component innovations, the rights to which might be held by many competing parties—be they patent rights or assigned use rights via commercial contracts or licenses. And the number of separate rights needed to produce a new innovation will only escalate as biotechnology patents become more prevalent. If ownership of these rights is diffuse and uncertain, it can be difficult or impossible for potential users to successfully negotiate with all of the relevant parties.

Yet agricultural researchers in many developing countries are freer than one might think to make use of innovations protected in the developed countries. This is because there is no such thing as an "international patent right." A patent or other intellectual property right awarded in, for example, the United States does not *a priori* confer property rights in the rest of the world. Patents and other intellectual property rights are awarded by national governments, and the protection conferred extends only as far as the geographic boundaries of the country in which the right is awarded. Thus, to obtain patent protection in several countries, innovators must apply for and gain rights in each. Anyone is

free to make, use, or sell whatever technology or knowledge is available for crops in countries where that technology is not subject to intellectual property protection, irrespective of whether the crop is grown for subsistence or commercial use or whether the technology is protected elsewhere.

The extent of freedom to operate in less-developed countries is not well understood. For example, the recent vitamin A rice innovation (“golden rice”) reportedly requires permission to practice over 70 patent rights. The well-publicized donations by major corporations of their intellectual property relevant to vitamin A rice left a strong impression that the exercise of large numbers of crucial patent rights was being relinquished in favor of the poor in developing countries. In fact, in some major rice-consuming countries, there are no valid relevant patents, and in most, there are very few. Similarly, the well-publicized donations of virus-resistant technology for some noncommercial potato varieties in Mexico and for sweet potato in Africa apparently do not involve any patents relevant in the target countries. Finally, a survey reported fairly widespread use of protected intellectual property by the centers of the Consultative Group on International Agricultural Research, in many cases without formal authorization from the patentees. But no distinction was drawn between patents valid in developed countries and those valid in the centers’ host countries.

Though there is no international patent, international treaties and organizations do play an important role in intellectual property rights: they make it easier to extend protection to multiple countries and provide a uniform, minimal set of laws and standards that apply to all subscribing countries. Increasingly, innovators in developing countries are seeking intellectual property rights in developed countries, and vice versa. Currently, however, in the fields of agriculture and agricultural biotechnology, the type and scope of protection varies greatly from country to country, especially between developed and developing countries. This variation makes it more difficult to assess whether there is freedom to operate on an international level.

HOW PRODUCTION AND TRADE PATTERNS AFFECT INTELLECTUAL PROPERTY RIGHTS

Crop breeders in the developing world are free to produce crops as long as the inputs and processes used and the crop varieties grown are not protected under local intellectual property laws. But those crops cannot be legally exported to countries where they fall under intellectual property protection. In such cases the importer, not the breeder, may be infringing on intellectual property rights.

A recent IFPRI study looked at production and trade data for 15 of the crops most important to research agencies operating in developing economies: rice, wheat, maize, soybeans, cassava, coconut, groundnuts, bananas, beans, potatoes, sorghum, lentils, millet, barley, and chickpeas. As a group, the developing countries accounted for an average of more than 65 percent of the world’s production of sorghum, beans, and lentils during 1994–98. For the rest of the 15 crops, they accounted for more than 90 percent of world production (and for quite a few of these crops, more than 98 percent).

The majority of these crops were never traded across international borders. Of the 15 crops, soybeans, coconuts, bananas, lentils, and beans are the only ones for which more than 10 percent of developing-country production is exported. Just two crops (soybeans and bananas) account for 64 percent by value of developing-country crop exports to the developed countries, and just four countries (Argentina, Brazil, Costa Rica, and Ecuador) account for 42 percent of such trade in these two crops. When exports of rice to developed countries (mostly from Thailand) and coconuts (mostly from the Philippines) are added into the soybean and banana exports, these four crops account for 80 percent of the total exports from developing to developed countries. Of these four crops, only rice and coconuts are staples in the exporting countries. (The traded bananas are dessert bananas; the staple cooking bananas are almost entirely consumed domestically.)

Freedom to operate depends upon specific circumstances. An investigation of the intellectual property rights assigned to the key enabling technologies used to transform crops revealed that these rights are mainly held in, and are therefore primarily relevant to, rich-country jurisdictions. Thus, for most of the crops that matter for food security in poor countries, researchers' freedom to operate is not impeded—much of the needed technology is unencumbered by intellectual property rights in developing countries and little of the developing-country production gets shipped into developed-country jurisdictions where intellectual property rights may prevail. This does not mean, however, that freedom to operate is not a problem for developing-country research on export-oriented cash crops such as horticultural products, tropical beverages like coffee or cocoa, or dessert bananas.

FOCUSING ON THE REAL PROBLEMS

The largely misplaced concerns that patents and other forms of intellectual property are currently severely constraining the freedom to operate in developing countries is diverting attention from more crucial issues for agricultural researchers working on staple food crops.

During the 1990s, growth in investment in agricultural research in and for developing countries stalled. For some regions like Africa it even began to shrink. Furthermore, many developing countries lack the scientific skills to effectively access the rapidly advancing stock of complex modern biotechnologies, whether they are protected by patents or not. As a matter of fact, most are not protected in these developing countries. Failure to invest in developing the domestic expertise needed to evaluate, access, and regulate the new technologies is currently a far greater constraint than freedom to operate.

Failure to invest in developing the domestic expertise needed to evaluate, access, and regulate the new technologies is currently a far greater constraint than freedom to operate.

Moving forward in the 21st Century, the intellectual property landscape will be altered by the Trade-Related Aspects of Intellectual Property (TRIPs) agreement, which introduced minimum standards for intellectual property rights for new technologies by which all members of the World Trade Organization must abide. As developing countries come into compliance with the intellectual property rights provisions of the TRIPs agreement, the implementations of those provisions—both domestically and in export markets—will affect researchers' freedom to operate in future technologies of research and development. TRIPs requires that member states allow patents for inventions but with certain exceptions. The precise nature of these exceptions has yet to be resolved. Members are not required to allow plants to be patented, but they are required to protect plant varieties, either through patents or through a *sui generis* system (such as plant-breeder rights), or through a combination of both systems.

The misconception that intellectual property rights currently impair freedom to operate of developing-country breeders of food staple plants also threatens these countries' effectiveness in bargaining for access to the scientific outputs of private corporations. By the mid-1990s, just over one-half of the estimated US\$21 billion (1993 prices) of agricultural R&D in rich countries was done by private firms. Much of the know-how and many of the constructs used to improve crop varieties now reside in these corporations. Institutional arrangements to facilitate effective partnerships between the public and private sectors in agricultural R&D are just beginning to emerge. These arrangements could help enable the sharing of expertise along with the products and processes to do the breeding and, perhaps, help direct some private research toward poor peoples' crops. Many of these public-private arrangements involve institutions in rich countries and are still largely unresolved regarding research directed toward the poorer parts of agriculture in developing countries. Bridging this private-public divide can have profound long-term development consequences, but it behooves all parties to have a proper perception of their present degrees of freedom in order to effectively tap intellectual property on behalf of the world's poor.

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A PRIMER

A Primer on Intellectual Property Rights and Agricultural Biotechnology

Intellectual property refers to products of the mind. Inventions, computer programs, publications, videotapes, and music are all examples of intellectual property. Intellectual property rights afford a time-limited legal protection to artistic, scientific, technological, or economic products. Copyrights, trademarks, design patents, utility patents, plant patents, plant breeders' rights, and trade secret laws are some of the ways of protecting intellectual property rights. The type of intellectual property to be protected and the legal and administrative system of the country where the right is being sought affect the extent of rights, such as the scope of the protection and the geographical limits to and duration of the rights.

In plant breeding, patents and plant breeders' rights have generally been the most important forms of intellectual property protection. As the biotechnological revolution unfolds, however, copyrights are becoming more important because the databases that hold information about plant genes can often be copyrighted. Such copyrights do not, however, affect trade in products developed using the protected information. U.S. state trade secret laws have been used to protect in-house breeding materials such as the inbred lines of maize used as parents of hybrids, but these laws do not protect against independent discovery or reverse engineering of products by their purchasers. Hence, patents afford stronger protection than trade secret law for innovation embodied in products. Trademarks are used for the protection of brand names of biotechnologies, such as Monsanto's Roundup Ready™ technology or Aventis's Liberty® and LibertyLink® technologies. Trademarks only protect the names and other symbols denoting products or technologies, not the technologies themselves.

Patents

The patent right is generally considered the most powerful tool in the intellectual property system, enabling the patent holder to exclude all others from making, using, selling, or offering to sell the invention in the country that granted the patent right or importing it into that country, if it is made elsewhere, for as long as the patent remains valid. To be patentable, an invention must satisfy the criteria of novelty, nonobviousness, and utility or industrial application. In addition, an inventor is required to describe the invention to the public in a manner sufficiently clear and complete for the invention to be reproduced by another person skilled in the art.

While many member countries of the World Trade Organization are still in the process of implementing a protection system for plants, the United States and Europe have led the way in allowing utility patents for plants, particularly for transgenic plants. In 1985, the U.S. Patent Office Board of Appeals ruled that asexually and sexually propagated seeds, plants, and tissue culture could be protected by utility patents. More recently, the European Patent Office has held that transgenic methods and plants are not per se unpatentable.

Plant Breeders' Rights

Plant breeders' rights (PBRs), or plant variety protection, are a form of intellectual property protection for plants offered in most developed countries and a growing number of developing countries. While countries differ in how they implement PBRs, the laws usually grant protection to varieties that are novel, distinct, uniform, and stable. Thus, the variety must not have been previously sold, be clearly distinguishable from previous varieties, be uniform, and breed true to type. The holder of a plant breeder's right has a legal monopoly over commercialization of that variety for a prescribed length of time, allowing the recovery of the cost of breeding commercially valuable new plant varieties. Although the details of protection vary from country to country, in general, the sale, reproduction, import, and export of new varieties of plants are encompassed. Exceptions may be made, however, for research, breeding of new varieties, and use of seed saved by a farmer for replanting. Moreover, in some countries, if a protected variety is used as the basis for a transgenic plant, the latter is covered by the plant breeder's right if it constitutes a variety "essentially derived" from the protected variety.

Contractual and Technological Proprietary Tools

In addition to the legal protection afforded by patents and plant breeders' rights, contractual provisions may be used to extend or establish intellectual property rights. Such contracts include

- *material transfer agreements* between technology developers and third parties, which limit the transfer and use of materials such as vectors, genes, and plants developed by the transferor;
- *bag label contracts* between the manufacturer and the buyer of seed, for example, which limit further uses of purchased material that would otherwise be allowable;
- *technology use agreements* between technology suppliers and farmers, which typically control the right to plant a given seed on a specific area of land for a certain period of time; and
- *licenses* between patent or property holder and licensee, which are negotiated grants of some or all of the holder's rights, such as allowing the use and sale of the technology.

There are also a number of genetic technologies that impose technical limits on farmers' use of seeds from their harvest to replant or to sell for replanting. The most common is production of hybrid crops that generally have a lower yield through loss of "hybrid vigor" if replanted. Modern alternatives include genetic use restriction technologies that confer sterility on replanted seeds—popularly dubbed terminator technologies—and others that allow reproduction but prevent expression of proprietary traits until the plant is treated with a specific chemical activator.

In a world where decisions can create big winners and losers, IFPRI's research shows that the poor need to be winners in the struggle to achieve rapid economic growth. IFPRI provides the knowledge that helps decisionmakers protect and improve the lives of the poor while abetting sustainable economic development. How can poor farmers be encouraged to adopt both yield-increasing technologies that make the world more food-secure and better land and water management practices that ensure a sustainable future? What kinds of public investments reduce poverty the most, thereby clearing the way for broad-based

RESEARCH AND RESEARCH AND OUTREACH OUTREACH

economic growth? What can be done to improve the health and nutrition of the poor, thus fostering economic development? How can more efficient markets improve poor lives and national economies? What kind of global trading arrangements serve both poverty reduction and environmentally friendly growth? These and other pressing concerns of the world today are addressed in the descriptions of IFPRI research that follow. The descriptions show the breadth of IFPRI's work as it pursues its mission to end hunger and poverty through sustainable growth.

ENVIRONMENT AND PRODUCTION

ENVIRONMENT AND PRODUCTION TECHNOLOGY

THE RAPIDLY GROWING world population requires new agricultural technologies to boost food production. Only with higher, sustainable yields can more people feed themselves without harming the environment. IFPRI's Environment and Production Technology Division conducts research on the institutions and policies that promote agricultural growth, environmental sustainability, and poverty reduction. "Our work," says division director Peter Hazell, "creates the context in which farmers will use the most appropriate means possible to climb out of poverty, manage natural resources effectively, and feed the world's growing population."

MAKING THE MOST OF SCARCE WATER

Freshwater is essential to sustain life, enable development, and support a healthy environment. However, population and economic growth—especially in developing countries—drive up water demand from households, industry, and agriculture, causing deterioration of watersheds and irrigated land. Because of widespread and increasing water scarcity, IFPRI researchers focus on water on many levels—local, river basin, national, and global.

In 2000 IFPRI initiated a major research effort on the Dong Nai river basin in Viet Nam and the Brantas river basin in Indonesia. "Both basins are significantly influenced by ongoing water policy debates at the national and regional levels," says team leader and IFPRI senior research fellow Mark Rosegrant. "They face increasing water scarcity and competition for water among the various users and growing water quality problems."

A case study of Chile's Maipo River basin, which has relatively advanced water management institutions, including tradable water rights, was completed in 2000. This study showed that trading water rights moves water into higher-valued agricultural and urban-industrial uses. The trading of water rights is a boon to almost all interest groups, and the benefits can be increased even more through policies to reduce the cost or increase the efficiency of water trading. According to Rosegrant, "Allocating water through water trading is more beneficial for farmers than administered pricing of water, because it protects farm income. Farmers benefit by selling some of their water to urban areas."

On a global level, Rosegrant and his colleagues developed the IMPACT-WATER model, which simulates the complex relationships among water availability and demand, food supply and demand, international food prices, and trade at the regional and global levels over a 30-year time horizon. "This model allows us to look at the long-term dynamics of change in the water sector and how it influences water use," says Rosegrant. "Moreover, it provides an integrated linkage at the global level between water supply and food production, demand, and trade."

Preliminary results indicate that the rapid growth in water demand by households and industries, coupled with a continued slowdown in investment, could be a serious threat to future growth in food production. If countries fail to invest in managing and using water more efficiently—in both irrigated and rainfed areas—the world could see slowing agricultural production and sharp rises in international cereal prices, creating hardships especially for low-income developing countries and poor consumers in these countries.

MEASURING THE WORTH OF AGRICULTURAL RESEARCH AND TECHNOLOGY

Where is a developing country's money best invested? In roads? Health care? Education? Agriculture? Policymakers face these tough choices regularly. One factor they take into account when making decisions is the likely social payoff to their investments. New research from IFPRI now gives them a clearer view of the rates of return they can expect from investments in agricultural research and development. In other words, just what do you get from a dollar invested in agricultural R&D?

Many reports cite annual rates of return to agricultural research to be in the range of 40 to 60 percent. But IFPRI researchers took a closer look at the literature.

"We made a concerted effort to assemble all the available evidence on the returns to agricultural R&D investments published since 1953," says Philip Pardey, IFPRI senior research fellow and leader of the IFPRI team that conducts research on agricultural science and technology policy.

"We searched for studies published in refereed journals, book chapters, monographs, and discussion papers." The researchers assembled 292 studies reporting a total of 1,886 rate of return estimates—around 6 estimates per published study.

"Our key finding is that the averages and representative ranges presented by previous reviews reveal little meaningful information about rates of return," says Pardey.

"The average reported rate of return is much higher than is commonly understood, but the dispersion around the average is large, making it hard to discern meaningful patterns in the rates of return."

Accounting for the large variation in the reported rates of return, the team found no evidence that rates of return had declined over time. They found too that returns may be higher when the research was conducted in more developed countries (perhaps because of better research infrastructure or better research training). The returns also varied by problem focus: as one might expect,

research on perennial crops, natural resource management (primarily forestry), and livestock with longer production cycles had lower rates of return. Assumptions about such things as the lag time between R&D spending and agricultural output or productivity also affected estimations of rates of return.

The authors' efforts to understand the sources of variation in the rates of return and to summarize and interpret this large body of evidence should be useful to policymakers who wish to use evidence on rates of return to support investment decisions.

In 2000 the IFPRI team also released the third version of a software package called DREAM, or Dynamic Research Evaluation for Management, which evaluates the economic consequences of agricultural R&D for agricultural producers and consumers.

"With DREAM you can explore the economic effects of a range of market, technology, and adoption scenarios," says Stanley Wood, an IFPRI senior scientist.

DREAM scenarios can include any number of individual markets or production "regions." After specifying the initial conditions for each region, DREAM simulates the likely effects of technology development and adoption on prices; on quantities produced, consumed, and traded; and on the flow of economic benefits to producers, consumers, and government.

DREAM can represent research-induced changes in both production and consumption, as well as technological effects that remain constant or change over time in farmers' fields. DREAM has been applied to the evaluation of individual projects in a national context as well as to entire commodity sectors at a subcontinental or continental scale. And while it was designed primarily to evaluate options for R&D that have yet to be undertaken, DREAM has also been successful in analyzing the effects of past research.

IFPRI's work on agriculture and technology policy was featured in "Growing Pains," a series of articles in *The Economist's* March 2000 survey on agriculture and technology.

A DONOR'S VIEW OF IFPRI

Danida: IFPRI Brings Together Nutrition and Plant Breeding

Danish International Development Assistance (Danida) has supported the micronutrients project of the Consultative Group on International Agricultural Research (CGIAR)—a project for which IFPRI is the lead center—since 1995.

IFPRI's research is innovative because it brings together the fields of plant breeding and nutrition. The focus on the staple crops rice, wheat, maize, beans, and cassava and on the micronutrients iron, zinc, and beta-carotene holds great potential for reducing micronutrient malnutrition among poor population groups. The plant breeding strategy promises to be a sustainable and cost-effective approach for addressing some of the grave public health problems facing developing countries.

Danida's work with IFPRI complements other Danida-funded research activities in Denmark and developing countries, which focus on improving the density and bioavailability of nutrients in commonly consumed foods. These combined efforts can help Danida shape its programs related to agriculture, leading to a greater concern not only for increased yields of foods produced, but also for better nutritional quality and other benefits for poor consumers.

– Klaus Winkel

Head, Department of Development Research
Danida

Journalist Shereen El Feki referred to IFPRI's joint work with the World Resources Institute on the report entitled *Pilot Analysis of Global Ecosystems: Agroecosystems*. The report is the first comprehensive audit of the ability of world agriculture to provide food and other goods and services—such as fresh water, biodiversity, and carbon storage—that are vital for sustaining human life. The survey focuses on the pressure on farmers to produce more but with less harmful effects on the environment.

The study presents a wealth of new spatial information and interpretations about the global extent of agriculture and the soil, water, and other environmental constraints faced by farmers. It also identifies gaps in our ability to assess the environmental consequences of agriculture and the likely trade-offs involved in obtaining more food and environmental benefits from agroecosystems.

PUBLIC INVESTMENTS: WILL IT BE RESEARCH, ROADS, OR EDUCATION?

Weihong and Xiaoming grew up in poverty on a farm in Jinagsu in southeastern China. Their mother and father, like most parents, expected them to earn a living on the farm when they grew older. But like many young adults of their generation who benefited from China's push for quality rural education in the 1970s and 1980s, Weihong and Xiaoming used their schooling to get jobs that moved them off the farm and out of rural poverty.

Little did Weihong and Xiaoming know that their story would represent the role public investments would play in reducing rural poverty in China. But that's the model many researchers see. Few, though, have attempted to determine which public investments boost growth and reduce poverty the most.

This is where IFPRI senior research fellow Shenggen Fan and his team of IFPRI and Chinese researchers come in. "We asked ourselves, 'Which is better, to put public money into research, roads, or education?'"

Spurred by the idea that government investments might play a role in helping to reduce poverty, Fan and his colleagues pored over provincial data in China. They found that per capita income in rural China was extremely low before rural reforms began in 1978. The average farmer grossed an

annual salary of around 220 yuan, or US\$150. China was one of the poorest countries in the world. But all that changed dramatically after reforms began.

Farmers' incomes soared. The number of poor in rural China declined more than 80 percent between 1978 and 1997, from 260 million to 50 million. "A reduction of poverty this large has never occurred before in the history of the world," says Fan.

Behind this outcome were a series of policy reforms that spurred rapid growth in agricultural production and phenomenal increases in nonfarm employment. However, even with the economic reforms it would have been impossible to achieve such rapid economic growth and poverty reduction if the Chinese government had not invested in technology, rural education, and infrastructure for the last several decades.

To find out how public spending had reduced poverty, IFPRI joined hands with Beijing's Chinese Academy of Agricultural Sciences, the Center for Chinese Agricultural Policy, the State Development and Planning Commission, and Nanjing Agricultural University. Researchers from these institutions began quantifying, among other things, how many poor people were lifted out of poverty for each yuan the government spent on different items between 1970 and 1997.

Fan and his team released preliminary results at a workshop in China that included several officials from the central government in Beijing. Findings show that all government spending on production-boosting investments, such as agricultural research and development (R&D), irrigation, rural education, and infrastructure (roads, electricity, and communication), contributed to yield growth and rural poverty reduction.

But government spending on education had the largest impact on poverty reduction and the second-largest impact on production growth. "Education spending is clearly the dominant 'win-win' strategy," says Fan.

Public spending on agricultural R&D increased production growth the most and had the third-largest impact on poverty reduction. Spending on rural infrastructure had the second-largest impact on poverty. All these effects come mainly from improved nonfarm employment and increased wages.

The research also shows that the effects of different types of investments varied greatly across regions. "If the government wishes to maximize poverty reduction, then it should target larger investments in education and rural infrastructure to the western region," says Fan. "If the government wishes to maximize production growth, then it should definitely target more investments in agricultural R&D and education to the central region."

Without a doubt government spending has improved the lives of millions in China. Today Weihong has a textile business in his hometown, and Xiaoming is a carpenter in Shanghai. They each make well above the average Chinese salary.

Fan is carrying out similar research in India and Viet Nam and hopes eventually to do the same in Sub-Saharan Africa.

LESS-FAVORED LANDS CAN OFFER MORE

The Tigray region is home to some of the poorest people in Ethiopia. Its unfavorable agroclimatic conditions—poor soils and sporadic rainfall—make escape from poverty an especially difficult task. As Tigray farmers try to make ends meet amid population growth, they often deplete nutrients from soils and encroach on forests, further threatening a weak natural resource base. Not only is land an unpredictable partner in Tigray, but markets can be distant, further narrowing commercial options.

The same scenario unfolds on other less-favored lands—marginal and arid lands, forests and woodlands—where about 1.8 billion people live. Because of rapid population growth, these areas are becoming ever-larger focal points of poverty, food insecurity, and environmental degradation.

What level of investment can reverse the vicious circle found in less-favored lands, and what are the trade-offs of investing in these areas versus favored areas? To answer these questions, IFPRI researchers are conducting in-depth studies in several less-favored areas. Team leader John Pender, an IFPRI research fellow, is working in Ethiopia in close partnership with the International Livestock Research Institute (ILRI) and Ethiopian collaborators. The team is looking at how different development pathways can yield both economic and ecological benefits. The researchers are particularly interested in how communities manage natural resources.

Findings show that eucalyptus trees, which are drought resistant, offer a high return to investment. But these trees may have a negative ecological impact, and the team is investigating this possibility. According to Pender, “The potential returns are quite high, but the regional government is taking a cautious approach, promoting planting only on degraded lands and thus minimizing any environmental risks.”

In terms of the communal management of resources, the team found that communities in Tigray believed that they were not allowed to harvest trees from community woodlots. “The regional government, in response, has been working to establish clear guidelines for communities to manage their woodlots,” says Berhanu Gebremedhin of ILRI, who is leading the research in Tigray.

Researchers have also found that although external organizations such as the regional Bureau of Agriculture (BOA) played a pivotal role in facilitating the establishment of community woodlots, they inadvertently discouraged local efforts to manage the woodlots. “The BOA is now working cautiously to make the role of external organizations demand-driven and complementary to local efforts,” says Gebremedhin.

A similar effort is also underway in other parts of Ethiopia, Honduras, and Uganda. Different soil types, farming systems, institutions, and policies have been characterized. Soil fertility depletion and erosion have been identified as key contributors to land degradation, and strategies for sustainable land management have been proposed. A recently completed market survey found that the input market in Uganda has grown rapidly owing to market reforms and demand for improved technology. However, input provision is still predominantly a government activity with few private traders. As with the work in Ethiopia, the merits of different pathways to sustainable development of less-favored lands are being examined.

HAS AGRICULTURAL RESEARCH HELPED THE POOR?

While it is clear that the Future Harvest centers supported by the Consultative Group on International Agricultural Research have helped raise the world's agricultural production, it is not so clear how this research has affected the world's poor. To what extent have the poor gained, either as farmers, consumers, or wage earners, as a result of agricultural growth? Researchers at IFPRI are attempting to answer this question in collaboration with their colleagues in the CGIAR. Addressing this question can help realign research priorities and identify the investments and policies required to improve welfare in developing countries.

The first phase of this work involved a review of existing studies. Researchers found that while agricultural research can have favorable impacts on the poor, these impacts are not inevitable because they depend on enabling socioeconomic conditions. When research does benefit the poor, it does so by increasing yields and farm income, lowering food prices, and increasing nonfarm employment opportunities. "Most of these studies have focused on Green Revolution technologies and how they impacted the

poor," says Peter Hazell, director of IFPRI's Environment and Production Technology Division, who comanages the project with Lawrence Haddad, director of the Food Consumption and Nutrition Division. "Our focus now is on new types of research that the CGIAR is doing, such as agroforestry, natural resource management, and participatory approaches to development."

Haddad and Hazell have selected some promising lines of research that some Future Harvest centers have been engaged in for a few years. Two case studies, linked to other IFPRI research projects, are underway in India and China. Five other case studies, focusing on the direct impact of agricultural research, will be carried out by the International Rice Research Institute, Centro Internacional de Mejoramiento de Maíz y Trigo, and the International Centre for Research in Agroforestry, with more to follow. "The idea is to undertake in-depth analysis of impacts on poverty," Hazell explains. "This is real grass-roots work; we try to find a control group and then try to quantify gains between this group and those who adopt CGIAR technologies."

The methodology of choice is a framework that integrates both social and economic analysis. "We need to look at impact from the total perspective of a poor household," Hazell explains. "What are the million things that poor households do to survive, and how do new technologies impact on that in a holistic way? This may be virtually impossible to quantify, but it can be partially captured quantitatively. Exploiting the synergies between the economic and social analysis leads to a much richer consideration of what poverty is," says Hazell.

The findings of the different case studies will be synthesized in 2002 to reveal how research has affected poverty on a number of different levels. Team members also hope to learn how to better integrate economic and social analysis in order to make future poverty impact assessments.

MAKING RULES TO MANAGE NATURAL RESOURCES: PROPERTY RIGHTS AND COLLECTIVE ACTION

Who has access to natural resources? What type of access do they have? When can they exercise their claims? The answers to these and other questions about property rights are often not clear in developing countries because either property rights are poorly defined or there are competing state and local rules and understandings. How property rights are defined with respect to different types of natural resources affects a farmer's choice of crop and natural resource management practices; struggle with poverty; and impact on the environment.

The Future Harvest centers' Systemwide Program on Collective Action and Property Rights (CAPRI) studies these issues. It is a collaborative program involving the 16 Future Harvest centers, national research institutions, nongovernmental organizations, and universities. IFPRI is the convening center for the program. According to team leader Ruth Meinzen-Dick, an IFPRI senior research fellow, one of the program's primary goals is to strengthen the capacity of Future Harvest centers to study the role of property rights and collective action in natural resource management.

"Even though we didn't quite expect it at the beginning, these issues have struck a chord throughout the CGIAR system — not only with the centers focused on natural resources, but also among those doing crop-specific research," says Anna Knox, an IFPRI research analyst who is also on the team. A number of centers that are commodity-focused find that property rights and collective action come into play in their studies: community-based collective action to preserve genetic diversity is one example. To facilitate such research, CAPRI also awards research grants to the Future Harvest centers.

CAPRI develops conceptual frameworks for addressing issues related to property rights and collective action and disseminates findings, not only through printed publications, but also increasingly via the Internet and an email list-serve. The CAPRI website (www.cgiar.org/capri) features the program's publications, a searchable project inventory, and an annotated bibliography.

CAPRI also brings researchers from different disciplines together through policy and technical workshops in order to find common ground. In 2000 the program held a technical workshop that addressed the role of property rights and collective action in managing watersheds. According to Knox, "Not only did it bring the biophysical scientists on board, but it also took the social scientists further in terms of the methodologies they use to study watershed resource management."

IFPRI itself has undertaken extensive research on property rights and collective action issues, looking at rangelands, water, cropland, and forests. IFPRI researchers are studying the most effective ways of providing secure property rights to farmers and the means by which communities mobilize for

collective action.

Underlying this research is the notion that without secure rights to land, farmers often are unwilling to adopt newer or riskier technologies or to make the investments that lead to sustainable natural resource management.

Nancy McCarthy, a research fellow, and her colleagues are investigating rangeland management practices in Sub-Saharan Africa and in North Africa and West Asia. According to McCarthy, "Many livestock production systems on rangelands continue to rely heavily on mobility. This has led to all sorts of property rights that can't be neatly categorized." The interplay of complex property rights over vast terrains is often poorly understood and contributes to a plethora of policies that often conflict with each other.

Moreover, patterns of land use and mobility are changing. IFPRI researchers are now questioning many of the basic assumptions made about livestock management. Preliminary findings from Ethiopia and Niger, for example, indicate that farmers do not hold onto more animals in high variability environments as is commonly believed. This finding calls into question the role of livestock as asset security and therefore has implications for drought mitigation strategies and livestock management policies.

IFPRI has also completed household surveys in Jordan, Morocco, and Tunisia to investigate how each of these countries manages its rangelands. Plans are underway to undertake complementary research in Syria that will examine women's access to natural resources and their role in household livelihood strategies.

FOOD CONSUMPTION AND NUTRITION

“GOOD NUTRITION DEPENDS on proper access to food, care, and health and sanitation services,” says Lawrence Haddad, director of IFPRI’s Food Consumption and Nutrition Division. “Poor nutrition is a violation of an individual’s human rights, and it causes untold suffering. Improvements in nutritional status are now being used to judge the success of a wide range of development strategies. But nutritional improvements are not simply markers of today’s development gains—they also underpin tomorrow’s successful development outcomes in areas such as educational performance, HIV/AIDS prevention and mitigation, child survival and corresponding declines in desired family size, and overall economic growth.” The Food Consumption and Nutrition Division conducts research on ways to improve access to food and to use that food for good nutrition and health. It investigates how policies, programs, and institutions affect community, household, and individual food security, nutrition, and poverty reduction. Underlying its work is the belief that proper nutrition and good health are necessary if individuals and economies are to reach their full potential.

CREDIT: A LIFELINE FOR THE POOR

Farming is an inherently risky enterprise. Any number of factors can ruin a farm household’s livelihood—drought, flood, pests, poor prices for agricultural goods. To help farmers and other poor people in developing countries survive lean periods, access to credit, savings, and insurance services are essential. Since 1994 Manohar Sharma and his colleagues have studied if and how poor households in nine countries use financial services. They have supplemented these country studies with a survey of 1,300 microfinance institutions. Their work has helped them identify what financial institutions must do to offer sustainable credit and savings services that are of greatest benefit to the poor.

What have they found? “First of all, you can’t make broad generalizations. Conditions are different between and within countries, resulting in different patterns of demand for financial services,” says Sharma. “Services have to be tailored accordingly. For example, a farmer may be most cash-strapped in July, when she needs to finance inputs for planting, but most income accrues only after the December harvest. So she is searching for a financial package that matches this type of seasonality. In contrast, the daytime vegetable vendor in the city may be looking for ways to finance purchases in the morning wholesale market and repay at the end of the day.” Only when microfinance institutions achieve a close match between demand and supply can they both maximize social impact and cover their costs.

“Each institution also has its own niche,” says Sharma. “A format that allows large-scale provision of services in densely populated areas in Bangladesh, for example, may be inappropriate in serving widely dispersed populations in semi-arid Africa. There is a tendency among some advocates to try to emulate a successful model in other countries, but replication will not always work.”

Still, even though programs are not easy to replicate, the various kinds of microfinance institutions can nourish each other by exchanging knowledge. For example, larger institutions can draw upon the pool of innovations that have been developed and tested by smaller, usually nonprofit, organizations.

One message comes through loud and clear: a renewed emphasis on agricultural finance is needed. In past decades, subsidized credit was provided through agricultural development banks that had few incentives to be effective or efficient. “In the 1980s,” according to Sharma, “we desperately needed a new approach, and we found one in microfinance. Unfortunately agricultural finance lost important ground in the process, even if unintentionally.” Microfinance institutions have focused more on financing nonfarm enterprises such as small-scale trading and periurban-based commodity production rather than agricultural operations. “We shouldn’t throw the baby out with the bath water,” says Sharma. “And a renewed focus on agricultural finance is urgently called for.”

After all, most of the world's poor consist of entrepreneurs engaged in both agricultural production and non-agricultural activities. Credit and savings are needed for both."

To get these important findings out, the IFPRI research team produced 15 briefs summarizing the results of the last 6 years and sent them to policymakers, researchers, and microfinance institutions all over the world in 2000. Additionally, the team completed a manual on how to assess the poverty levels of microfinance clients, based on case studies from India, Kenya, Madagascar, and Nicaragua.

URBAN CHALLENGES TO FOOD AND NUTRITION SECURITY

The world is witnessing a major demographic transformation as ever-greater numbers of people in developing countries migrate to and make their living in cities. Within two decades, more poor and malnourished people will live in cities than in rural areas. What can policymakers do to help the urban poor live healthier, more productive lives?

"Although the broad causes of malnutrition and food insecurity in rural and urban areas are the same," says research fellow James Garrett, "the specific nature and magnitude of those causes are different. An unhealthy environment, for example, undermines food security in both rural and urban areas. But the greater crowding in urban areas heightens the negative effects of inadequate sanitation and unsafe drinking water."

Despite these differences and the rapid expansion of urbanization in developing countries, most research on food security still focuses on rural areas. To help millions of urban poor in developing countries escape poverty and hunger, research into the nature of the causes of food insecurity and malnutrition in urban areas is urgently needed.

Garrett is collaborating with CARE on a project to improve urban livelihoods in Bangladesh. In 2000 the project team examined the level of livelihood insecurity among households in the slums of two Bangladeshi cities, Tongi and Jessore.

Although households in Tongi have higher incomes than those in Jessore, they are more vulnerable. This is because Tongi is essentially a part of Dhaka, a megacity of more than 10 million people. This integration with Dhaka magnifies the problems Tongi households face. Jessore, on the other hand, is more isolated and much smaller. The mix of middle class and poor in the low-income areas of Jessore also accounts for the greater livelihood security there. Over the next three years, IFPRI will help CARE evaluate the operations and impact of its household-assistance program in these two cities.

A DONOR'S VIEW OF IFPRI

USAID: IFPRI Makes the Case for Agricultural Research

In assessing the work of an international research center such as IFPRI, the usual tendency is to think in terms of direct impact on developing countries. But these centers also have a substantial indirect effect through their influence on donors and their assistance programs. In the case of the U.S. Agency for International Development (USAID), this is particularly true of IFPRI. USAID has felt the institute's influence most strongly in two areas: the setting of strategic priorities and the case for support of agricultural programs.

In the case of strategy, IFPRI's influence starts at the top. IFPRI's director general has played a vital role in presenting the big picture of food security through speeches, testimony, and consultations, in many cases as part of the 2020 Vision initiative, which has been a constant source of useful analysis and reports. Projections from IFPRI's IMPACT model were important in making the case for an African Food Security Initiative to both USAID and Congressional policymakers. President Clinton announced the initiative in Uganda in March 1998, signaling the beginning of a 10-year commitment to improve food security in that continent. This strategic focus was also incorporated into the subsequent "Africa: Seeds of Hope" legislation. IFPRI's continuing research will be vital in maintaining support for this program.

IFPRI's work has also helped strengthen the case for support for international agricultural research programs such as those of the Consultative Group on International Agricultural Research (CGIAR) and U.S. universities. While the research efforts are designed primarily to help developing countries increase productivity of basic foods, they have also proven to be of broader benefit. The improved wheat and rice varieties developed by international centers, for example, have played an extraordinary role in the improvement of U.S. varieties. IFPRI research was the first to quantify the value of this contribution, and further IFPRI studies, soon to be published, will reinforce the case for agricultural research. Members of the same team have also carried out analysis of the cost of genebanks—a critical piece of information in seeking more secure funding for their maintenance.

As good as IFPRI's work is, it will never be done. There will always be new problems. And there will always be a battle to secure funding to assist agricultural development. Without IFPRI's contributions to policy and public information, this task would be far more difficult.

– Emmy B. Simmons
Deputy Assistant Administrator
USAID

In Mozambique, Garrett is working with the Ministry of Planning and Finance on a study of urban employment patterns in the country. The research shows how important agriculture is even to urban Mozambicans. In all cities other than Maputo, agriculture employs the majority of the population. Most women in urban areas work in agriculture. But those individuals who work in agriculture as a primary occupation tend to belong to poorer households than those who work primarily in other sectors. The study will give Mozambican policymakers insight into the diversity of urban life and its complex relationship with rural life, thereby helping them devise more effective urban and rural development policies.

Work also began on a CARE project to improve urban livelihoods in Maputo, Mozambique. Among other goals, the project focuses on strengthening municipal government, generating savings and income, and improving water quality and sanitation.

In Guatemala, IFPRI is examining the impact of a government-sponsored community day-care program on food security in the poor areas of Guatemala City. "This program, which provides meals and care to children of working mothers, is a success," says research fellow Marie Ruel, leader of IFPRI's work on urban food and nutrition security. Children participating in the program have significantly better diets than that of nonparticipants. Participants consume 20 percent more energy, protein, and iron and 50 percent more vitamin A than those outside the program.

"Even the weekend diets of children in the program were better," notes Ruel, "which suggests that the day-care program improved the general nutritional habits of households with preschoolers." As a result, the overall nutritional well-being of children has improved, auguring well for a healthier adult life. IFPRI presented its research results to program managers at a workshop in 2000, describing options for making the program even more effective.

In urban Ghana, Ruel and her collaborators are identifying care practices that are associated with better growth among children living in poor households. "We wanted to understand why some children managed to grow well despite the fact that they were living in precarious, unhygienic, and impoverished conditions, in which most children grow poorly. Did differences in distribution patterns within the household, use of time by mothers, or quantity and quality of care explain the resilience of these children and their ability to develop and thrive?"

In Guatemala, IFPRI is examining the impact of a government-sponsored community day care program on household food security in the poor areas of Guatemala City.

Ruel and her team found that better-growing children were more likely to receive proper nutrition during early infancy; that their mothers tended to return to work later after delivery, probably as a result of less severe economic constraints; and that they ate more nutritious meals in their second and third years of life. Mothers of poorly growing children spent less time preparing food at home, keeping their children clean, and maintaining a clean environment, thus increasing health risks for their children. "Our findings highlight the importance of programs that improve maternal care and nurturing practices and that assist mothers in their demanding dual roles of income earner and principal caregiver," says Ruel.

WOMEN'S INCOME IMPROVES CHILDREN'S LIVES

Saja Ajjad is a 33-year-old mother of five—four girls and one boy—ranging in ages from 6 to 14. She and her husband, a farmer, live in one room on the family compound in the district of Jessore, Bangladesh. She has no formal education, so when her husband allows her to, she works as a field laborer. Her children are well fed when her money buys the food, but when she has no money coming in, she worries whether her daughters get enough to eat.

Rashida Ahmed has little fear about her children's next meal. She had some grade school education and participates in a rural microcredit program. She and her husband supplement income from their farm in Manikganj District with livestock sales from the goats her father gave her when she married. She also grows improved vegetable varieties disseminated by a nongovernmental organization (NGO) on a garden plot near her home. At 35 years old, Rashida earns plenty of income for food, clothing, and a secondary-level education for both her son and her daughter. Her membership in the NGO and a government-sponsored scholarship for girls have taught her that her daughter's education is just as important as her son's. And her daughter is doing better at school than are girls with less-educated mothers.

In Bangladesh, where birthrates are high and literacy is low, Saja and Rashida, as wives and mothers, have levied premarital assets into bargaining power and income into food and clothing for their children.

The story is similar elsewhere. IFPRI research has shown this, in Ethiopia, Ghana, Guatemala, Indonesia, and South Africa.

During the past several years, Agnes Quisumbing and her 15-member IFPRI research team have been looking at how gender and practices within households influence the success or failure of development policies. They have worked with more than 20 collaborators analyzing data from household members in all six countries, plus Brazil, Ecuador, Nepal, Peru, the Philippines, and Zimbabwe. What they have found is that a woman's education, assets, and status within the household contribute significantly to the welfare of her children, especially girls.

"In Bangladesh, Ethiopia, Indonesia, and South Africa, increasing a woman's assets raises investments in education and girls' health," says Quisumbing, an IFPRI senior research fellow.

Findings show that women's roles as producers of food, managers of natural resources, income earners, and caretakers make a huge difference in food and nutrition security for their families.

For instance, given the right resources, women can be highly productive farmers. In Sub-Saharan Africa women typically have less access to education and to labor, fertilizer, and other farming inputs than men do. When women obtain the same levels of education, experience, and farm inputs that benefit the average male farmer, they may be able to increase their yields for maize, beans, and cowpeas by 22 percent.

Research also shows that an investment in a woman's education is an investment in the sound nutrition of her current or future children. The IFPRI research team examined factors that helped reduce child nutrition by 15 percent in the developing world between 1970 and 1995. They found that women's education accounted for 43 percent of the total reduction in child malnutrition, by far the largest contribution of any factor.

Whether households favor girls or boys when handing out food depends where in the world they are situated. In Sub-Saharan Africa, where males often pay to get a spouse, daughters have slightly better nutrition outcomes than sons. South Asia has the strongest evidence of a pro-male bias when it comes to food allocation.

And as the example of Saja and Rashida shows, the strength of this tendency can depend on the assets held by wives. "A mother's resources are generally more beneficial for girls, while a father's are more beneficial for boys," says Kelly Hallman, an IFPRI research fellow. This explains why boys fare better than girls in households dominated by men, still the case in most countries.

IFPRI researchers looked back another generation to find the source of most women's assets.

"For a Bangladeshi wife, her parental landholdings positively and significantly affect the value of her assets at marriage," says Quisumbing. The total value of a wife's assets was also higher when her father had some secondary education, she adds.

While policymakers recognize the importance of gender and household issues, they are often myopic when it comes to how resources—food, money, time—are actually distributed within households. IFPRI's work can help policymakers develop more successful policies, by taking into account the realities that govern people's lives.

BREAKING OUT OF THE CYCLE OF POVERTY

If your parents are poor, chances are that you are poor too. Your children will likely follow in this chain of poverty, which tends to be passed from one generation to the next. Mexico has undertaken a novel way of breaking this cycle of poverty and asked IFPRI to help determine how well its approach is working.

The project leader, IFPRI senior research fellow Emmanuel Skoufias, says that PROGRESA, an antipoverty program created and financed by the Mexican government, was founded on the belief that the only way to fight poverty in the long run is to invest in people's health and education and to remove some of the income constraints that families face.

"This program gives money to families in exchange for enrolling their children in school and making sure that all family members visited a health center regularly," says Skoufias. "It is believed that in time, the poverty trap will be broken, that the intergenerational transmission of poverty will stop. Unlike most poverty alleviation approaches based on piecemeal interventions, this program may change the way we attack poverty."

But does it work? Overall Skoufias and his team found that PROGRESA was highly successful. Participants showed measurable improvements in dietary quality, prenatal care, household consumption, and school attendance, among other things. "For such programs to be effective, the key element is to find out who the poor are. Targeting is very important," says Skoufias. Currently more than 2.5 million families are enrolled in PROGRESA.

Other Latin American countries are following PROGRESA's lead. Honduras and Nicaragua have already adopted similar programs. IFPRI senior research fellow Rafael Flores and an IFPRI/Honduran team have been in charge of evaluating Honduras's PRAF program, which provides cash to poor households in targeted localities. Payment is contingent on children's attending school and pregnant women and mothers' participating in preventive health care programs. This program relies on mothers to play an important role in monitoring their children's growth and taking corrective actions and on volunteers within communities to provide timely health advice to them.

Through studies such as these, IFPRI researchers expect to better understand the building blocks of poverty alleviation programs. Once these building blocks have been assembled, policymakers can design programs that are more cost-effective and beneficial to the poor. "In the past, researchers have not closely examined how programs like this should be designed," says Flores. "If we have to give cash transfers, what size should these be? Many human capital interventions deal with cash transfers to the poor, but there is not much information on how to set this up. Programs like PROGRESA and PRAF can provide some answers."

These studies of antipoverty programs are only one element of IFPRI's portfolio of poverty research. Around the world, IFPRI researchers seeking to understand the links between food insecurity and poverty are scrutinizing political and institutional factors that affect poverty interventions, helping agencies to identify and characterize the poor, and helping selected countries develop the capacity for poverty alleviation research and policies.

THE SEARCH FOR MORE NUTRITIOUS STAPLE FOODS TO FIGHT "HIDDEN HUNGER"

Nutritionists and policymakers are now well aware that millions of people in developing countries suffer not just from a lack of calories and protein, but also from a lack of micronutrients—the vitamins and minerals the body needs to function. Because of these micronutrient deficiencies, millions suffer from illness and impaired physical and mental development. But getting micronutrients to the people who need them is far from easy. In the developed world, people have easy access to fortified foods and vitamin supplements, in addition to enjoying a typically varied and nutritious diet. Not so in the developing world, where staple foods make up a large percentage of the diet and the majority of foods are not processed. In developing countries, a worthwhile approach is to make the foods that people already eat more nutritious. The CGIAR Micronutrients Project is working to assemble a package of tools that plant breeders around the world can use to produce crop varieties that are rich in iron, zinc, and vitamin A.

"Plant breeding has two advantages compared with standard supplementation and fortification programs," says Howarth Bouis, the IFPRI senior research fellow who coordinates the CGIAR's multidisciplinary effort. "With supplementation and fortification, your costs repeat year after year. With plant breeding you invest in it, and once you've done the breeding your annual costs go down substantially. Second, supplementation and fortification programs must be paid for in each country you have them in. But with plant breeding you can do the research in one country and watch the benefits spread all over the world."

CGIAR researchers already have on hand a high-yielding variety of aromatic rice that also happens to be rich in iron. "The next step," says Bouis, "is to prove that when you feed people the iron-rich rice, their bodies can actually absorb and utilize the iron." To do this, collaborators at the University of Los Baños in the Philippines came up with a unique test group: nuns in several Philippine convents, who are relatively isolated and often anemic.

The nutritional trials are slated to begin in 2002. "It took us a whole year to grow out enough rice for this study, and then two typhoons hit the trial plots at the International Rice Research Institute just before the harvest, requiring us to replant," Bouis recalls. If the trials are successful, policymakers will have a powerful new weapon to fight iron deficiency, a significant health problem in much of Asia.

Researchers have begun screening germplasm for the other target crops—wheat, maize, beans, and cassava—and hope to begin breeding programs soon. These programs will require substantial investments, but as Bouis notes, “The cost-benefit ratio of plant breeding makes it by far the most efficient approach to this problem. If you throw in increased crop yield as a benefit, the efficiency goes up even further. It was presumed that there would be trade-offs between nutritive value and yield in developing these nutrient-rich varieties, but this assumption proved to be wrong.” Recent research has shown that trace minerals are as important for plant nutrition as for human nutrition.

OVERCOMING MALNUTRITION IN ASIA

The concentration of malnutrition in Asia is greater than anywhere else on Earth. One in three preschool children is stunted, for instance, rising to one in two children in the South Asian countries of Bangladesh, India, and Nepal. IFPRI is leading a team of researchers to learn more about the problem—and what can be done about it.

The research project focuses on nutrition throughout the life cycle. “Basically this means not carrying out isolated interventions, but rather, adopting a long-term, life-cycle perspective on nutritional improvement,” says IFPRI research fellow Stuart Gillespie. The goal is to target resources at critical points in the life cycle, particularly for very young children, pregnant women, and to some extent adolescent girls.

In fact, research has shown that fetal and infant under-nutrition increases the risk of adult chronic disease later in life, a strong argument for early intervention. According to Gillespie, “Low birth weight is enormously high in Asia. There are links between this and the chances of developing cancer or cardiovascular disease later in life. So children are at risk of being sick and even dying in the short term, and if they do survive they may suffer from chronic disease later on in life.”

Undernutrition, characterized by low birth weight, stunting (being short for one's age), and wasting (being underweight for one's height) in childhood, and vitamin and mineral deficiencies throughout the life cycle are highly prevalent in Asia, and particularly in South Asia. "And even though the problems of undernutrition are still there," says Gillespie, "we are also seeing an emergence of overnutrition in some countries, characterized by obesity and dietary imbalances, which increase the risk of chronic disease."

Tackling these complex problems requires a holistic approach using a range of policy interventions. For example, community-based programs that encourage people to give infants and mothers better care and nutrition are known to work. When such programs are linked to service delivery mechanisms, such as primary health care clinics, they are particularly effective in Asia. The experience of Thailand is a model in this regard. Micro-nutrient fortification and supplementation programs can also help. To be successful in the long run, however, direct interventions such as these need to be underpinned by poverty-reducing economic growth. Research results, to be published in 2001, will be used as the Asian Development Bank's basis for formulating nutrition policy and to inform policy dialog on nutrition in Asian countries.

NETWORK OF IFPRI ASSOCIATES

IFPRI has long-term collaborative ties with a number of researchers and policy advisers from institutions in developing and developed countries. The Network of IFPRI Associates formalizes these ties, making members of the network key contacts for research and outreach activities in their fields of expertise and in their countries of origin or citizenship. Network members carry the title of IFPRI associate and have research or outreach experience in issues related to IFPRI's mandate. Potential members of the network are identified and proposed by IFPRI research fellows or division directors, reviewed by the Senior Management Team, and approved by the director general. The skills and experience of IFPRI associates are equivalent to those of IFPRI research fellows or senior research fellows. Associates frequently visit IFPRI headquarters, collaborate with IFPRI researchers, and have access to IFPRI's library, data sets, computer facilities, and program support. Official network affiliation has thus far proved to be beneficial to both IFPRI and the individual associate. In 2000, 12 associates collaborated with IFPRI research staff on research and outreach projects.

Julian Alston, University of California, Davis, U.S.A. (Australia)

Margaret Armar-Klemesu, Ministry of Health, Ghana (Ghana)

Rafael Celis, ProDesarrollo Internacional, Costa Rica (Colombia)

Marcel Fafchamps, Oxford University, U.K. (Belgium)

Robin David Graham, University of Adelaide, Australia (Australia)

Jikun Huang, Chinese Academy of Sciences, China (China)

William Masters, Purdue University, U.S.A. (U.S.A.)

Julian May, Policy and Praxis, South Africa (South Africa)

Marcus Noland, Institute for International Economics, U.S.A. (U.S.A.)

Siddiqur Osmani, University of Ulster, Ireland (Bangladesh)

Keijiro Otsuka, GRIPS/FASID Joint Graduate Program, Japan (Japan)

Linxiu Zhang, Chinese Academy of Sciences, China (China)

MARKETS AND STRUCTURAL STUDIES

THE TRANSFORMATION of rural economies from subsistence to commercial, and national economies from closed to open, can create hardship for many. Guiding this transformation and its accompanying development of markets and supporting infrastructure and institutions is critical. IFPRI's Markets and Structural Studies Division analyzes how to guide these transformations so that they can best contribute to agricultural growth, poverty alleviation, and food security. "In the developing world," says division director Ashok Gulati, "agricultural markets are often imperfect and very risky. We analyze the institutions and infrastructure that lead to these imperfections and the policy changes that can remove the distortions. The goal is to cut transaction costs so that producers get a better price while consumers pay less."

GETTING THE MARKETS RIGHT

A wave of market liberalization took place in developing countries in the 1980s and 1990s, but in spite of many countries' attempts to loosen government controls over the economy, competitive and efficient agricultural markets have often failed to emerge. An IFPRI research team led by research fellow Mylene Kherallah is now asking how governments can help create institutions to help developing countries realize the benefits of market reform.

According to Kherallah, attempts at market reform have been incomplete. "Liberalization has led to some positive changes," she says, "but reforms have been overly focused on price liberalization and not enough on institutional and structural problems." Examples of institutional deficiencies are the absence of official property rights over land and weak contract enforcement mechanisms.

Sub-Saharan Africa is an area of particular focus. "Infrastructure is particularly poor in Africa," says Kherallah. "It is very expensive to get things in and out of countries. By the time some inputs get to farmers, probably more than half of the cost to farmers can be attributed to transport." Governments have also been spending less on the provision of rural services, such as extension, as a result of structural adjustment policies.

Often markets simply fail to provide necessary goods and services—such as credit to help farmers buy agricultural inputs. "There's a lot of talk about the institutional mechanism needed to provide credit to rural farmers," says Kherallah. "But given that farmers have no collateral and given that a private entity is not going to extend credit if they can't ensure loan repayment—especially when contracts are not enforceable—there are few options available. One of the institutions we are revisiting is contract farming. For example, a group of farmers can contract with a trader who provides the necessary inputs. At harvest, the trader purchases the output and recovers the cost of the inputs."

Research in Benin and Malawi has shown that smallholder cash-crop farmers in both countries are three times more likely to fertilize their maize fields than are non-cash-crop farmers. These spillover effects of growing cash crops, according to Kherallah, are not restricted to larger-scale rich farmers but "cut across poverty lines." In Malawi, she notes, small tobacco farmers have organized themselves into clubs to have better access to credit and to be able to sell their output at the auction floor.

Kherallah has also completed a short-term study in Kenya looking at how grades and standards for agricultural products are affecting the horticultural industry. More stringent criteria imposed on horticultural imports by the United Kingdom have forced Kenyan growers to adapt. "Smaller farmers can be closed out of these important export markets," warns Kherallah. "Among French bean producers, for example, some small farmers have been able to meet the new standards, but there's now some preference toward larger farmers who may be more technically and financially able to meet the standards.

Case studies in Ethiopia, Mozambique, and Uganda are also underway. Drawing on these case studies, Kherallah and her colleagues seek to identify the types of institutions that can help farmers and the rural poor get better access to competitive markets.

WILL THE POOR PARTICIPATE IN THE NEXT FOOD REVOLUTION?

For many poor farmers, raising livestock has been a way of increasing incomes and improving diets. Because of changing global diets, there is now more scope than ever before for livestock production to help lift the poor out of poverty. "Demand for meat, fish, and dairy products in developing countries is increasing rapidly," says project leader and senior research fellow Chris Delgado, "and

production of these high-value commodities has soared." So far, though, smallholders have not benefited as much from the boom as they might have because high-volume markets for high-value commodities tend to require specialized knowledge and better quality control.

To harness the potential of export-led growth for small producers, IFPRI and collaborators in Africa and Asia are analyzing the factors that affect the participation of the poor in this rapidly evolving sector. "High-value commodities such as livestock," says Delgado, "offer one of the few production opportunities the rural poor have to better their incomes significantly."

The rapid growth in animal product consumption in developing countries has been dubbed the "next food revolution." Delgado and collaborators have begun their study of this revolution by looking at peri-urban livestock and dairy production in Bangladesh, Kenya, and the Philippines. "Livestock activities that used to be small-scale or backyard activities are now rapidly scaling up," says Delgado. "We are attempting to develop options for assisting small-scale operators to compete with larger producers."

Delgado and collaborators from ILRI, the University of the Philippines at Los Baños, Bangabandhu Agricultural University in Bangladesh, and the Institute for Policy Analysis and Research in Kenya are measuring the economies of scale contributed by technology, better organization, bulk purchase of inputs, and outright "policy distortions." "The first three can be addressed by improved producer institutions, whereas the latter is best addressed by increased transparency," says Delgado.

Another rapidly growing component of this food revolution is aquaculture. According to Delgado, "aquaculture is the fastest growing source of food in the world and becoming of major importance in world food supply." Fish trade has risen dramatically, making it one of the most important food exports from developing countries during the last 20 years. A large variety of fish are consumed globally, and researchers from IFPRI, ICLARM—The World Fish Center, and the Food and Agriculture Organization of the United Nations are trying to capture this diversity in their analysis of fish production, consumption, and trade. The research team is integrating aquaculture—fish and feed items used

to produce fish—into IMPACT, the global food model created by IFPRI senior research fellow Mark Rosegrant. “This has been difficult,” says Rosegrant, “as no one else has yet succeeded in encapsulating the hundreds of commercially traded fish species into a global model.” Initial results are encouraging, however, which bodes well for developing the tools that will help us understand the complex food, trade, and environmental issues posed by this sector.

CAN VIETNAMESE AGROINDUSTRY BEAR FRUIT?

Ravaged by a long and destructive war and later constrained by centralized management, Viet Nam has made substantial economic gains in the last 10 years. Its economy is growing rapidly, fueled by market liberalization and export growth. Viet Nam is now well placed economically and geographically to be a key exporter of fruits and vegetables to high-income markets in East Asia, particularly Hong Kong and Singapore. It is a low-wage country compared with its neighbors, giving it a comparative advantage in labor-intensive activities such as horticultural production.

To help Viet Nam realize its potential in this sector and to ensure that the poor become part of this rural development opportunity, IFPRI is conducting a study on the income-generating potential of fruit and vegetable processing. Surveys of producers, processors, traders, and institutions will provide an idea of the problems and constraints that exist within that sector. Next, researchers will identify policies needed to facilitate development of fruit and vegetable processing. “We’re defining processing broadly to include any kind of value added after harvest, such as sorting, cleaning, and packaging for export,” explains Nicholas Minot, team leader and IFPRI research fellow. “One of the big issues is, how can you ensure that smallholders participate, either as suppliers or processors themselves, in this high-value sector?”

Postharvest work and agroindustry are promising avenues for raising the incomes of the poor for several reasons. Above all, the declining share of agricultural gross domestic product means that the off-farm employment opportunities offered by postharvest activities and agroindustry are becoming increasingly important. These new sources of employment will also reduce migration to already overcrowded urban areas. Second, demand in the urban areas of developing countries is shifting increasingly toward higher-value-added products. And third, globalization is slowly easing access to world markets for such products, thus facilitating export-led growth strategies. “Incorporating the rural poor into broad-based postharvest and agroprocessing activities,” says Minot, “has the potential to raise their incomes significantly.”

Minot plans to carry out analysis of the fruit and vegetable sector in Bangladesh and hopes to extend the work to other countries in Asia and Africa. In addition, he and IFPRI senior research fellow Chris Delgado will examine the broader context of horticultural development and processing.

TRADE AND MACROECONOMICS

TRADE AND MACROECONOMICS

THE FOOD AND AGRICULTURAL sector in a developing country is inseparable from the rest of the national economy and the world market. Changes in world markets affect national economic growth, and changes in nonfood policies affect the performance of food sectors. IFPRI's Trade and Macroeconomics Division analyzes the impact that national policies and the global economic environment have on agriculture, poverty, hunger, and natural resource use in developing countries. "No country grows everything it wants or needs to eat," says division director Sherman Robinson, "so trade is an integral part of the quest for food security. How international trade is structured, how macroeconomic policies position agriculture within a national economy and that national economy within the global market system—these have always been critical questions for reducing hunger, but they have become more important as globalization accelerates."

MAKING MACROECONOMIC POLICIES WORK FOR RURAL DEVELOPMENT

Malawi is a sliver of a country. Wedged between Tanzania, Mozambique, and Zambia in southern Africa, its 10 million people are among the world's poorest.

Its economy is predominantly agricultural, highly dependent on products like tobacco and tea for export revenues. For nonagricultural goods the country relies heavily on the outside world, as it does on donors for economic assistance. With its underdeveloped roads and communications, it ends up paying additional "taxes" on much of its foreign trade.

On top of all that, in 1999 Malawi faced lower prices for its tobacco and higher prices for petroleum products, as well as fluctuations in its exchange rate.

So how did its fragile economy survive?

"That's a question we asked ourselves," said Hans Löfgren, IFPRI research fellow and leader of an IFPRI team that conducts research on macroeconomic policies, rural development, and household food security. In 2000 Löfgren and his IFPRI colleagues focused some of their work on these price changes, or external shocks. Their new understanding sheds light on the effects that external shocks can have on Malawi's efforts to alleviate poverty.

"The shocks of 1999 placed a severe burden on Malawi," says Löfgren, "particularly on the nonagricultural population." Agricultural households were least exposed to external shocks because their incomes tended to be more diversified. Löfgren and company concluded that by diversifying what it produces and exports, Malawi could make itself less vulnerable to external price shocks and reduce the pressures that lead to sharp changes in its exchange rate.

The team's research aimed at generating detailed information, useful for Malawian policymakers, about both the impacts of such shocks and the role of antipoverty programs that could buffer future shocks. The research was carried out jointly with Malawian counterparts, and the project offered training in quantitative policy analysis to approximately 35 researchers, not only from Malawi but also from neighboring countries.

In this joint analysis, two poverty-alleviating policy changes were simulated: one in a public works program, the other in a land-reform program. "The first took a look at a planned expansion of an existing Malawian public works program to the equivalent of 250,000 full-time workers, and the second at a topic of growing importance in the region," says Löfgren.

The analysis showed that the public-works expansion could significantly help the rural poor, particularly since the program could self-target to this group. If the program improved infrastructure and thereby reduced transportation costs, it could spark the economy. The program could also take up slack in the labor market, hiring workers when they found no other employment. On the other hand, the nontarget population might be worse off because it generally pays the taxes that finance the program as it now stands.

The land-reform simulation showed that a tax-based, market-assisted program for redistributing land could benefit many households in Malawi, where land is scarce and unequally distributed. IFPRI's findings in Malawi have implications for other Sub-Saharan African countries that face similar conditions.

On a broader scale, Löfgren and his team—along with colleagues from the University of Malawi, the University of Zimbabwe, the Institute of Economics at the University of Copenhagen, and the World Bank—studied the interactions among agriculture, natural resources, and alternative policy regimes at the national and international levels. Agriculture's poor performance in the developing world during the last few decades had a major negative effect on national economic performance. While external pressures, such as long-term adverse terms-of-trade, harmed economies, domestic tax policies that discriminated against agriculture also slowed economic growth. IFPRI hopes to help policymakers learn more about how changes in macroeconomic policy affect agricultural performance, natural resource use, poverty, and overall income growth.

Löfgren's team continued their research on trade liberalization and macroeconomic reforms in Sub-Saharan Africa in 2000. Building on a decade of analysis and findings, they recently completed country studies of Mozambique, Tanzania, Zambia, and Zimbabwe, assessing the effects of reforms started in the early and mid-1990s. Their current country studies investigate the economic impact of domestic and international policy changes in Malawi, Mozambique, Tanzania, and Zimbabwe.

Löfgren's group is also working on a project that looks at El Niño's effects in Latin America and the Caribbean. The project supports a regional early warning system to mitigate the socioeconomic impacts of El Niño. IFPRI is combining work in Mexico with four descriptive country studies (for Honduras, Jamaica, Mexico, and Peru) to provide recommendations for investments that can help these governments prepare for and respond to future El Niño events.

SHAPING THE RULES OF WORLD TRADE

What do the actions of the World Trade Organization (WTO)—the international group that administers rules and arrangements for global trade—mean for poor countries that are food insecure? An IFPRI team led by research fellow Eugenio Díaz-Bonilla took a look at food security and trade negotiations in the WTO in 2000, as well as other trade-related issues.

The WTO has 140 member nations that account for more than 90 percent of world trade. More than three-quarters of WTO members are developing countries. The IFPRI team examined the relevance of the WTO's current classification of countries—developed country, developing country, least-developed country, and net-food-importing developing country. They found that this classification may need further refinement if it is to be useful as an indicator of national food insecurity. A number of developing countries classified neither as least-developed nor as net-food-importing are food insecure, while a number of net-food-importing developing countries are in a neutral food-security category. "The different categories of countries that WTO negotiations use should be made more precise to really capture the issue of food insecurity," says Díaz-Bonilla.

The team also studied the agricultural negotiations taking place under the WTO. IFPRI found that the WTO's Agreement on Agriculture does not appear to constrain countries' domestic policies that genuinely address poverty and food security issues, such as programs aimed at poor producers or consumers, stocks for food security, and domestic food aid for populations in need.

“The problems for developing countries are not legal constraints, but the lack of financial and human resources and institutional capabilities,” says Díaz-Bonilla. “For the negotiations to have a real developmental impact, the legal issues discussed in the WTO should be linked to firm commitments by international organizations and donors to provide greater financial support for rural development in poor countries.”

As part of the negotiations, IFPRI recommends that WTO member countries ask international organizations—the World Bank, the International Monetary Fund, and regional banks—to increase their funding and design new instruments to address agricultural and rural development, poverty alleviation, and food security issues.

In terms of regional integration, IFPRI’s work considers the impact of regional trade agreements, such as the South Africa–European Union trade agreement, the Southern African Development Community, the North American Free Trade Agreement, and other regional groups in Latin America. It is also working on issues of agricultural liberalization in the southern Mediterranean countries, including Turkey, Morocco, and the European Union. Results indicate that such agreements generally create trade and increase welfare. Gains are larger when developing countries can link up with an economy that is rich, large, or both.

During the last decade, globalization has attracted enormous interest. IFPRI is also studying the implications of this multifaceted phenomenon for rural development, poverty, and food security in developing countries.

COMMUNICATIONS

WAITING PATIENTLY FOR the outside world to call will ensure that an organization stays invisible to the outside world. So IFPRI researchers and the Communications Division work closely to identify how and when to spread the word about IFPRI research. “Communicating our research results is not an end in itself, it has to benefit the poor in developing countries. It is therefore our obligation to communicate the results of pioneering research proactively,” says Klaus von Grebmer, director of IFPRI’s Communications Division. “Furthermore, expert research without expert communication is not sustainable, and neither is the reverse. The combination of both, however, will increase IFPRI’s impact in providing sustainable options for ending hunger and poverty.”

FROM INFORMATION TO IMPACT

In 2000, the common denominator in the impact equation was IFPRI’s innovative communications projects and initiatives. Each one sought to promote IFPRI’s mission—conducting research to meet the food needs of the developing world on a sustainable basis—by communicating directly with those who can have an impact on policy.

PUBLICATIONS

Design and visual appearance, reader-friendliness and audience-specific language—these are essential ingredients for attracting readers and holding their attention as they read. The more understandable and digestible the content is, the greater the impact a publication makes on the reader. In 2000, IFPRI publications made use of all these ingredients to enhance impact.

During the past year, readers got a taste of this new visual identity, which includes a more imaginative and consistent use of color, illustrations, and photos. “We worked closely with researchers to develop materials that reflect a unified look and effective market appeal,” says Evelyn Banda, an IFPRI communications specialist who heads the Publications Services team. The redesign of IFPRI publications is still underway.

IFPRI also developed a new vehicle for conveying research results: four-page, full-color issue briefs. “This new series is a fresh way of presenting overviews of IFPRI’s research in an easy-to-read form,” said Heidi Fritschel, a senior editor who coleads the Editorial Services team with senior editor Uday Mohan. The new issues briefs published in 2000 focused on women and food security, capacity strengthening, and market reform in Sub-Saharan Africa.

In addition to its traditional ink-on-paper and more recent electronic (web) formats, IFPRI has also started producing many publications in digital format. In 2000 IFPRI copublished a CD-ROM on food and nutrition research with the United Nations University, in cooperation with several governmental, nongovernmental, and international partners. The CD-ROM contains the contents of the IFPRI website as of August 2000, publications from a number of national and international organizations, and software for policy analysis and research. The CD-ROM was distributed to users worldwide, including more than 1,500 users in Africa. Publications Services developed a listserve in 2000, which sends announcements of the latest news and publications from IFPRI to more than 3,000 email contacts. Sent twice monthly, the listserve provides web links to new publications and other material of interest to IFPRI’s audience.

IFPRI publications are becoming more accessible to non-English readers. Many publications are available in French and Spanish, and IFPRI’s new general brochure is now available in six languages: Chinese, English, French, German, Japanese, and Spanish. All translations are available on IFPRI’s website, and selected ones are available in print.

While thousands of readers download IFPRI materials from its website, thousands of others still rely on traditional mail distribution. In 2000 IFPRI reorganized its fulfillment system to process incoming orders more efficiently and sent out more than 11,000 copies of IFPRI publications worldwide.

See page 62 for a complete list of IFPRI publications for 2000.

LIBRARY

In 2000 Luz Marina Alvaré joined IFPRI as the new head librarian. She is working to help IFPRI's library become the focal point of knowledge management within the Institute. The library plays a key role in facilitating access to research information by IFPRI staff and its partners in developing and developed countries.

The library home page on the Intranet was set up in August to provide worldwide access to IFPRI's collections and information services. "This is a major step toward becoming a 'library without walls,'" says Alvaré. In its first four months, the library home page assisted more than 400 visitors.

An integrated library system (INMAGIC) now enhances users' access to IFPRI's collections. Nine international bibliographic databases became available via IFPRI's Intranet, and 29 additional databases became available online. In addition, more than 90 journals in agricultural economics and social sciences became electronically accessible, IFPRI publications received worldwide exposure in an international database (Worldcat), and interlibrary loans increased by 80 percent. IFPRI's library also joined other Future Harvest centers in a project to improve information and knowledge sharing within and across centers.

IFPRI ON THE WEB

IFPRI's website is an ever more important tool linking IFPRI to the world. At www.ifpri.org, visitors can access and download information on IFPRI's research activities, staff, and databases. They can also find out about the latest research findings, upcoming IFPRI events, and relevant web links. In 2000, IFPRI's website provided access to about 250,000 visitor sessions.

The number of materials downloaded from www.ifpri.org has grown tremendously. In 2000, there were more than 120,000 downloads of IFPRI publications. One-third of these downloads went to developing-country users.

IFPRI also created an online ordering system for IFPRI publications that has made ordering easier and more efficient and sparked a significant increase in publication requests.

POLICY SEMINARS

The Policy Seminars group coordinates and organizes IFPRI's workshops, seminars, and conferences. At the helm of the group is Laurie Goldberg, with more than 20 years' experience at IFPRI. Goldberg and her team help IFPRI present recent research results on topics of interest to IFPRI and its partners.

In 2000, Policy Seminars hosted 10 seminars and 3 book launchings at IFPRI. (See page 49 for a complete list of 2000 seminars, workshops, and conferences). The Policy Seminars group also threw muscle into two vital initiatives designed to improve future seminars: updating their mailing list and assessing audience satisfaction.

Policy Seminars began distributing evaluation forms in 2000. The forms are designed to elicit audience feedback and allow respondents to suggest topics for potential seminars. "They are an extremely valuable tool in assessing the quality of our seminars and give us hints about how we can improve," says Goldberg.

SEMINARS, WORKSHOPS, AND CONFERENCES, 2000

All meetings were held at IFPRI headquarters unless otherwise specified.

WORKSHOPS AND SYMPOSIA

IFPRI/German Agency for Technical Cooperation (GTZ)/German Foundation for International Development (DSE) Workshop on Impact of Agricultural Research and Extension on Productivity, Poverty, and the Environment, January 18–21

Roundtable Discussion on Cost Analysis of Micro-nutrient Interventions, held in Virginia, U.S.A., March 14

IFPRI/Asian Development Bank Seminar on Nutrition in Asia and the Pacific, held in the Philippines, August 30–September 1

POLICY SEMINARS

Agriculture, Developing Countries, and the WTO Millennium Round, Kym Anderson, School of Economics and Centre for International Economic Studies, University of Adelaide, Australia, January 13

2020 Vision Seminar—Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices, Lisa Smith and Lawrence Haddad, IFPRI, and Charles MacCormack, Save the Children/US, February 24

Participation and Poverty Reduction: Evidence from South Africa, John Hoddinott, IFPRI, March 31

Agricultural Market Reforms in Sub-Saharan Africa: A Synthesis of Research Findings, Mylène Kherallah and Nicholas Minot, IFPRI, April 13

Agricultural Trade and the Environment: Beyond the Green Box, Ford Runge, University of Minnesota, U.S.A., May 11

2020 Vision Seminar—Roots and Tubers in the 21st Century: Trends, Projections, and Policy Options, Mark Rosegrant, IFPRI, and Gregory Scott, Centro Internacional de la Papa, Peru, June 8

Food Aid and Human Security: European Perspectives, Edward Clay and Charlotte Benson, Overseas Development Institute, U.K., September 14

Overcoming the Double Burden of Malnutrition in Asia and the Pacific, Stuart Gillespie and Lawrence Haddad, IFPRI, September 28

Consumers' and Leaders' Perceptions on Biotechnology, Thomas Hoban, North Carolina State University, U.S.A., October 10

Biosafety Systems and Capacity Building: Policy and Implementation Lessons from Developing-Country Research, Joel Cohen, ISNAR, The Netherlands, November 30

2020 VISION PANEL DISCUSSIONS

Promoting Sustainable Development in Less-Favored Areas, John Pender, Peter Hazell, and Shenggen Fan, IFPRI; Simeon Ehui, International Livestock Research Institute, Kenya; and Shawki Barghouti, World Bank, U.S.A., November 16

BOOK LAUNCHINGS

Negotiating Water Rights, Bryan Randolph Bruns, Consulting Sociologist, and Ruth Meinzen-Dick, IFPRI, July 13

Out of the Shadow of Famine: Evolving Food Markets and Food Policy in Bangladesh, Raisuddin Ahmed, IFPRI, September 21

Foreign Aid and Development: Lessons Learnt and Directions for the Future, Finn Tarp, University of Copenhagen, Denmark, and Erik Thorbecke, Cornell University, U.S.A., October 2

IFPRI IN THE MEDIA

In 2000 almost 500 stories mentioning IFPRI's research appeared in newspapers, magazines, journals, and websites around the world. Several newspapers printed articles citing IFPRI research results, including *The Dawn* (Pakistan), *The East African* (Tanzania), *Economic Times* (India), *The Guardian* (United Kingdom), *Manila Times* (Philippines), and *Toronto Star* (Canada). News about IFPRI increasingly appeared in many international wire services—Africa News Service, Asia Intelligence Wire, Dow Jones News Service, and InterPress Service—and on many web sites, including Independent Online (based in South Africa) and Star Online (Malaysia). Washington correspondents from BBC Radio, the *Economist*, the Finnish Broadcasting Company, InterPress Service, and the Xinhua News Agency interviewed Per Pinstrup-Andersen and other IFPRI scientists.

In the United States, newspaper coverage of IFPRI research ranged from the widely read *USA Today*, with 2.1 million daily readers, to the super small *Iola Herald* (Iowa), with a daily readership of just under 1,300. A sampling of the U.S.-based media outlets that ran stories citing IFPRI research results includes Associated Press, *Boston Globe*, *Christian Science Monitor*, *Los Angeles Times*, National Public Radio, *New York Times*, *Washington Post*, and *Washington Times*.

"Media coverage is crucial for getting our message across to policymakers in both developing and industrial nations," says Michael Rubinstein, a senior communications specialist who joined IFPRI in 2000.

"Governments respond to the issues and ideas that appear in newspapers and on TV and radio."

TRAINING AND CAPACITY STRENGTHENING

IFPRI's Training and Capacity Strengthening team is dedicated to helping developing-country partners establish their own capacity for conducting food policy research and analysis. The group, led by IFPRI senior research fellow Suresh Babu, not only supports the training and capacity efforts of IFPRI researchers, but also publicizes IFPRI research through involvement in training and capacity strengthening activities of other institutions and international agencies.

Training support takes place in both developed and developing countries, including Bangladesh, Burkina Faso, Germany, Kenya, Malawi, the Netherlands, Uganda, and the United States. In collaboration with the United Nations Economic and Social Commission for Asia and the Pacific and the Asian Development Bank, Babu and his team held a workshop to address poverty-reduction policies with senior Asian government officials. They also continued to develop links with regional organizations such as the Southern Africa Development Community (SADC), the Network of Institutions Dedicated to Teaching Agricultural and Rural Development Policies for Latin America and the Caribbean (REDCAPA), and Sustainable Food Security in Central West Africa (SADAOC).

The Training and Capacity Strengthening group has also developed a network of policy training institutions and provided them with information on training opportunities and publications that could be used in their training programs. One of the ways they did this was by launching a training and capacity strengthening section of IFPRI's website. "The new section allows us to disseminate information about upcoming training opportunities and provide online access to training manuals," says Babu. Additionally, in order to bolster their mission in 2000, Babu's team set up a listserve and began working with the American Agricultural Economics Association to establish a distance education program.

A 2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

CREATING NEW KNOWLEDGE, bringing key issues to the table, fostering dialogue, and building a consensus about the best ways to alleviate food insecurity, reduce poverty, and achieve sustainable use of natural resources—these are the cornerstone activities of the 2020 Vision for Food, Agriculture, and the Environment Initiative. Through its work the 2020 Vision Initiative raises awareness about present and future food needs and helps promote action on meeting those needs through appropriate means. To achieve its goals, the initiative works to build bridges among key stakeholders in the public sector, private sector, and civil society.

In 2000 the 2020 Vision Initiative continued to seek broad impact on the dialogue on agriculture, growth, and poverty through its publications and a more focused impact on Africa through the 2020 Vision Network for East Africa. It also sought to revitalize debate and action on food security through a major international conference planned for 2001.

In its discussion paper series, the initiative published studies on roots and tubers, the causes of child malnutrition in the developing world, the benefits of integrated plant nutrient management, and the choices for managing biotechnology in developing countries.

The initiative focused on roots and tubers not only because these are some of the most important sources of food in the developing world, but also because roots and tubers often get treated in aggregate terms, obscuring their various uses and production performances. A detailed analysis of the trends and projections of the production and consumption of the major roots and tubers revealed significant regional differences. The paper analyzed the factors influencing these differences, assessed environmental impacts, and offered policy recommendations for overcoming supply and demand constraints.

Biotechnology could play a significant role in the production of some food crops important to developing countries. But what factors affect the willingness of developing countries to adopt genetically modified crops? The initiative published a paper that examined how, why, and to what extent developing countries are influenced by the international controversy on genetically modified crops. By classifying responses to the biotechnology revolution, the report revealed how open developing countries are to the revolution and which factors—biosafety, intellectual property rights, or others—affect that openness.

Technological innovations and increased food production are not enough to reduce child malnutrition. In fact women's education was more important than increases in per capita food availability in cutting child malnutrition in developing countries over the last 25 years. Following these two factors in importance were improvements in health and the physical environment and women's status. According to the paper published by the initiative, projected levels of child malnutrition will remain high through 2020, making strong action necessary to improve underlying factors, especially women's and girls' education.

The 2020 Vision Initiative continued with its new Focus series, which provides collections of expert overviews and policy recommendations on key topics. In 2000 two topics were covered: urban food and nutrition security and sustainable development in less-favored areas.

The initiative published 10 briefs on urban health, diets, agriculture, labor, gender issues, and markets. Experts addressed the challenges that the dramatic increases in

urban populations will bring over the next 20 years. Whereas most rural interventions to increase well-being aim at agriculture in some way, the authors of the briefs suggest that urban interventions must respond to a broader range of sectors and actors.

The other set of Focus briefs explored the options for promoting economic growth and reducing poverty in areas with low agricultural potential and poor access to markets. Home to 1.8 billion people, these areas are often neglected when it comes to agricultural research in favor of lands with rich soils and high yield potential. The nine briefs suggest, however, that technological investments and policies that build on the comparative advantage of less-favored lands could have real payoffs.

Other emerging issues and topics in the news were covered by the initiative's newsletter, which featured magazine-length articles and interviews with policymakers and civil society leaders on issues such as the digital divide, AIDS, debt relief, and trade negotiations.

Several of the initiative's publications analyzed the nature of global and regional hunger and food availability over the next two decades, using projections of food production, consumption, and trade from IFPRI's renowned IMPACT model. This global food model, supported by the 2020 Vision Initiative, continued to be refined and updated during the year, with the best, most recent information. A major study was initiated by IFPRI, ICLARM—The World Fish Center, and the Food and Agriculture Organization of the United Nations to incorporate fish into the IMPACT model and analyze the long-term contribution of aquaculture.

The 2020 Vision Network for East Africa became fully operational in 2000. The network seeks to reduce poverty and improve food security in the region by generating policy-relevant information through collaborative research activities, improving the dissemination and use of such information, and strengthening local capacity to undertake and communicate policy research. The network comprises Ethiopia (a new member in 2000), Kenya, Malawi, Mozambique, Tanzania, and Uganda.

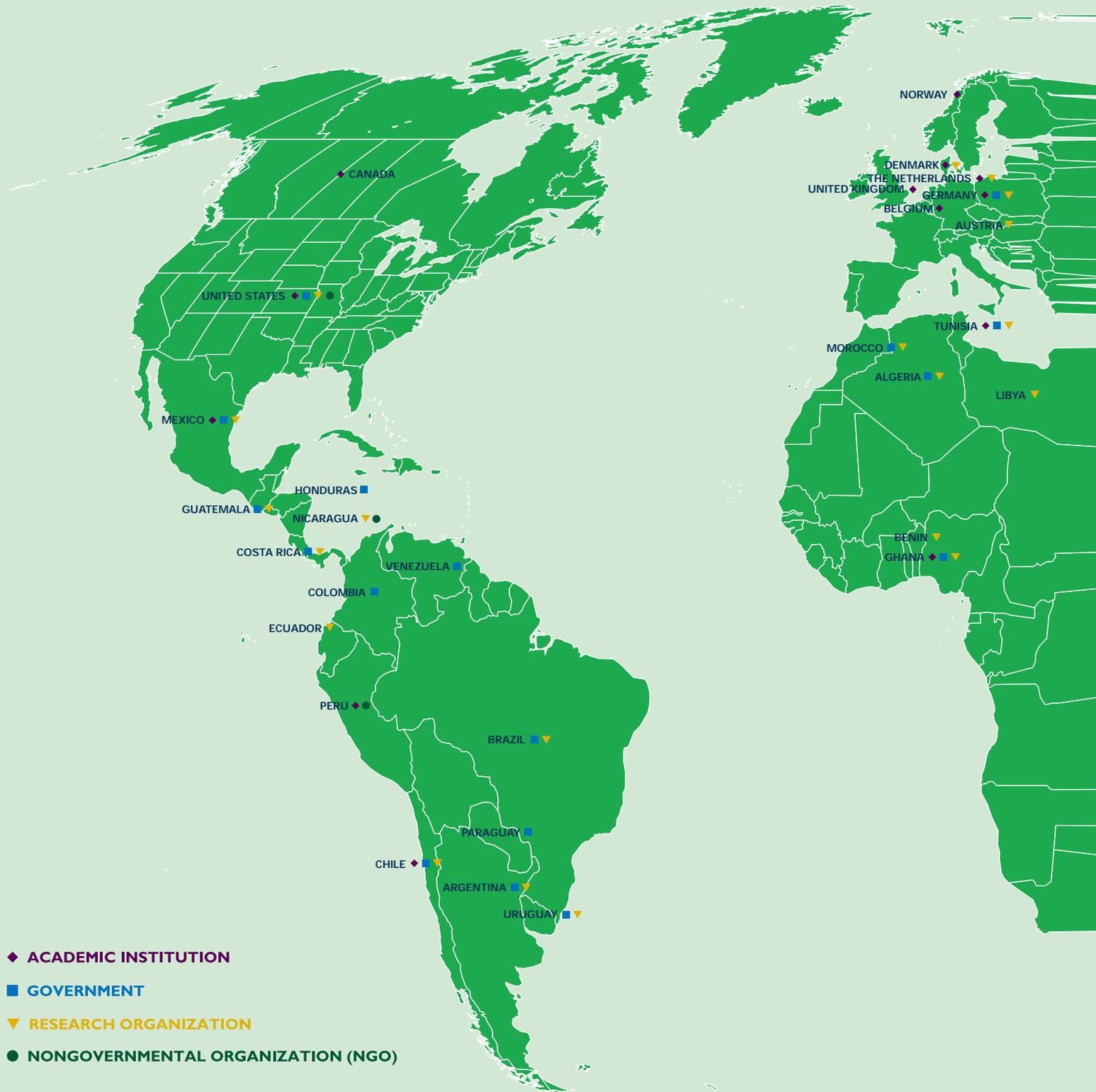
During 2000 the network launched a competitive grants program to support research on network priorities by network members. Twenty-seven proposals for in-country studies were received. Following two rounds of revisions a proposal evaluation committee of several leading experts on the region recommended that 10 proposals be funded at this time.

Plans got underway to offer network members training to improve their capacity to carry out policy research. The network also began preparations to conduct regional research activities on topics of priority to East Africa. Plans were developed to link students from East African universities and research institutes to network research activities. An email list serve was set up to facilitate communication among network members and others interested in network activities. And network collaborative links with the Eastern and Central Africa Program for Agricultural Policy Analysis (ECAPAPA) were further strengthened through information sharing and joint plans for training and publishing in the region.

During 2000, the initiative launched a major new research and communications activity to energize dialogue and catalyze action to achieve sustainable food security for all by 2020. The centerpiece of this activity is a major international conference to be held in September 2001 in Bonn. It is organized in collaboration with the German Federal Ministry for Economic Cooperation (BMZ) and other cosponsors. The conference will address why hunger exists, what forces will influence the prospects for food security in the next two decades, what the right priorities are for eliminating hunger, and who is responsible for acting on these priorities. The initiative worked closely with cosponsors to conceptualize the conference, commission the necessary background documents, and plan auxiliary activities such as poster and essay competitions for youth. The conference planning and funding are based on an innovative and productive partnership among organizations from the public sector, civil society, and private sector.

COLLABORATION

In 2000, IFPRI collaborated with around 300 local, national, regional, and international institutions. The local and national institutions include government agencies, universities, research organizations, and nongovernmental organizations. The map below shows the kinds of local and national institutions IFPRI worked with in each collaborating country.





COLLABORATING INSTITUTIONS IN DEVELOPING COUNTRIES

AFRICA

BENIN

Laboratoire d'Analyse Régionale et d'Expertise Sociale

ETHIOPIA

Addis Ababa University
Bureau of Agriculture, Planning and Economic
Development, Tigray, Amhara, and Oromia
Economic Commission for Africa
Ethiopian Agricultural Research Organization
Ethiopian Development Research Institute,
Prime Minister's Office
Ethiopian Economic Policy Research Institute
Mekelle University

GHANA

Ministry of Food and Agriculture
Ministry of Health
UNICEF-Ghana
University of Ghana, Legon
University of Science and Technology, Kumasi

KENYA

Biosystems
Institute for Policy Analysis and Research
Jomo Kenyatta University
Kenya Agricultural Research Institute
Kenya Forestry Research Institute
Kenya Institute for Public Policy Research and Analysis
Kenya Women's Financial Trust
Tegemeo Institute of Egerton University
University of Nairobi

MADAGASCAR

Institut National de Recherches Appliquées au
Développement Rural
Ministry of Research and Development

MALAWI

Bunda College of Agriculture
Center for Social Research
Malawi Rural Finance Company
Ministry of Women, Children, Community
Development and Social Welfare
National Economic Council
National Statistical Office
Reserve Bank of Malawi
University of Malawi

MOZAMBIQUE

CARE-Mozambique
Department of National Statistics
Eduardo Mondlane University
Ministry of Agriculture and Rural Development
Ministry of Planning and Finance

SOUTH AFRICA

South African Department of Health
University of Cape Town
University of Fort Hare
University of Natal
University of Pretoria

TANZANIA

Economic and Social Research Foundation
Planning Commission, the President's Office
Sokoine University
University of Dar es Salaam

UGANDA

Agricultural Economics Association of Uganda
Agricultural Policy Secretariat, Ministry of Finance,
Planning, and Economic Development
Appropriate Technology
Economic Policy Research Centre
Makerere University
National Agricultural Research Organization
Plan for the Modernization of Agriculture Secretariat,
Ministry of Agriculture, Animal Industry and Fisheries

ZIMBABWE

EcoNomics Africa
Ministry of Lands, Agriculture and Rural Settlement
University of Zimbabwe

ASIA

BANGLADESH

Association for Social Advancement
Bangabandhu Sheik Mujibur Rahman
Agricultural University
Bangladesh Institute for Nutrition and Food Science
Bangladesh Institute of Development Studies
Bangladesh Rural Advancement Committee
CARE-Bangladesh
Data Analysis and Technical Assistance
Food Management & Research Support Project
International Centre for Diarrhoeal Disease Research
Ministry of Food
Rangpur-Dinajpur Rural Services
Save the Children-Dhaka
University of Dhaka

CHINA

Centre for Chinese Agricultural Policy
Chinese Academy of Agricultural Sciences
Nanjing Agricultural University
State Development and Planning Commission

INDIA

Indian Council for Agricultural Research
Indian Institute of Management
Institute for Social and Economic Growth
Institute of Economic Growth
Jawaharlal Nehru University
National Center for Agricultural Economics and Policy
National Center for Agricultural Policy Research
National Institute for Rural Development
Punjab Agricultural University
Society for Helping, Awakening Rural
Poor through Education
Tamil Nadu Agricultural University

INDONESIA

Centre for Agro-Socio Economic Research
Jasa Tirta I Public Corporation
Ministry of Agriculture
State Ministry of Public Works and Water Resources
University of Indonesia
University of Jambi

PAKISTAN

Ministry of Food
Pakistan Institute of Development Economics

THE PHILIPPINES

Philippine Institute of Development Studies
University of the Philippines, Diliman
University of the Philippines, Los Baños

VIET NAM

Animal Husbandry Research Institute
Consulting and Research Company for Technology
Transfer and Investment
Department of Agricultural Policy and Rural
Development
Development Strategy Institute, Ministry of
Planning and Investment
Fruits and Vegetables Research Institute
General Statistics Office
Institute of Animal Sciences
Ministry of Agriculture and Rural Development
Ministry of Finance
Ministry of Planning and Investment
Postharvest Technology Research Institute
Sub-Institute for Water Resource Planning
Sub-Institute of Forest Inventory and Planning
Sub-National Institute for Agricultural Planning
and Projection
Transport Engineering Design Incorporated
Veterinary Research Institute

LATIN AMERICA AND THE CARIBBEAN

ARGENTINA

Instituto Nacional de Tecnología Agropecuaria
Secretaría de Agricultura, Ganadería, Pesca y
Alimentación

BRAZIL

Empresa Brasileira de Pesquisa Agropecuaria
Instituto de Pesquisa Economica Aplicada

CHILE

Catholic University
Instituto de Investigaciones Agropecuarias
Ministry of Agriculture

COLOMBIA

Ministry of Agriculture

COSTA RICA

Ministry of Agriculture
Ministry of the Environment
ProDesarrollo Internacional

ECUADOR

Center for Population Studies
Instituto Nacional de Investigaciones Agropecuarias

GUATEMALA

Community Day Care Program of the Secretary of
Social Work of the First Lady of Guatemala
Institute of Nutrition of Central America and Panama

HONDURAS

Government of Honduras
Programa de Asignación Familiar

MEXICO

Colegio de México
Escuela Nacional de Antropología e Historia
Instituto Nacional de Investigaciones Forestales,
Agrícolas y Pecuarias
Programa Nacional de Educación, Salud, y Alimentación,
Government of Mexico
Universidad Nacional Autónoma de México

NICARAGUA

Asociación de Consultores para el Desarrollo
de la Pequeña (ACODEP)
Red de Protección Social

PARAGUAY

Dirección de Investigación Agrícola

PERU

CARE-Peru
Catholic University of Peru

URUGUAY

Instituto Nacional de Investigación Agropecuaria
Programa Cooperativo para el Desarrollo Tecnológico
Agropecuário del Cono Sur

VENEZUELA

Ministerio de la Producción y el Comercio
(formerly Ministerio de Agricultura y Cría)

NORTH AFRICA/MIDDLE EAST

ALGERIA

Haute Commission de Développement de la Steppe
Institut Technique des Grandes Cultures

IRAQ

IPA Agricultural Research Center

JORDAN

Jordan University of Science and Technology
Ministry of Agriculture
National Center for Agricultural Research and
Technology Transfer
University of Jordan

LEBANON

Agricultural Research Institute
American University
Lebanese University

LIBYA

Agricultural Research Center

MOROCCO

Centre Regional de Recherche Agricole
Institut Agronomique et Veterinaire
Institut National de la Recherche Agronomique

PALESTINE

Palestine Economic Policy Research Institute

SYRIA

Directorate of Agricultural and Scientific Research
Ministry of Agriculture and Agrarian Reform
Steppe Directorates in Palmyra and Aleppo

TUNISIA

Ecole Nationale d'Agriculture de Mognane
Institut d'Economie Quantitative, Ministry of
Economic Development
Institut National de Recherche Agronomique de Tunisie
Ministry of Agriculture

TURKEY

Bilkent University

COLLABORATING INSTITUTIONS IN DEVELOPED COUNTRIES

ASIA/PACIFIC

AUSTRALIA

Australian Centre for International Agricultural Research
Australian National University
Center for the Application of Molecular Biology to
International Agriculture
Waite Agricultural Research Institute

JAPAN

Government of Japan

NEW ZEALAND

ANZDEC Limited
Lincoln International

EUROPE

AUSTRIA

International Institute for Applied Systems Analysis

BELGIUM

Université Libre de Bruxelles

DENMARK

Danish Institute of Agricultural and Fisheries Economics
Royal Veterinary and Agricultural University
University of Copenhagen

GERMANY

Centre for Development Research (ZEF),
University of Bonn
Federal Ministry for Economic Cooperation
and Development
German Agency for Technical Cooperation (GTZ)
German Foundation for International Development (DSE)
Hanover School of Veterinary Medicine
Institut fuer Agrar - und Sozialoekonomie in den Tropen
und Subtropen, Universitaet Hohenheim, Stuttgart
University of Göttingen
University of Hohenheim
University of Kassel
University of Kiel

THE NETHERLANDS

Free University
International Soil Reference Information Centre
Technical Centre for Agriculture and Rural Development
Wageningen University and Research Centre

NORWAY

Agricultural University of Norway

UNITED KINGDOM

Centre for the Study of African Economies, Oxford
University
London School of Economics
London School of Hygiene and Tropical Medicine
Sheffield University
University of Belfast
University of Sussex, Oxford

NORTH AMERICA

CANADA

Dalhousie University
School of Rural Planning and Development and
Department of Plant Agriculture, University of Guelph
University of Toronto

UNITED STATES

American Association for the Advancement of Science
Bread for the World
CARE-USA
Columbia University
Conservation International
Cornell University
Economic Research Service, U.S. Department
of Agriculture
Emory University
Eros Data Center, U.S. Geological Survey
Harvard University
Institute for International Economics
International Food Security Treaty Campaign
International Science and Technology Institute
Iowa State University
Keller Bliesner Engineering
Kenyon College
Laboratory for Global Remote Sensing Studies,
University of Maryland
Michigan State University
Montana State University
National Oceanic and Atmospheric Administration
Northwestern University
Ohio State University
Oregon State University
Peace Corps

Pennsylvania State University
Plant, Soil, and Nutrition Laboratory, Agricultural
Research Service, U.S. Department of Agriculture
Produce Marketing Association
Purdue University
RAND Corporation
Rutgers University
Save the Children-USA
Technoserve
Tufts University
University of Arizona
University of California, Berkeley
University of California, Davis
University of California, Los Angeles
University of Florida
University of Houston
University of Illinois
University of Kentucky
University of Maryland
University of Minnesota
University of North Carolina
University of Pennsylvania
University of Wisconsin, Madison
U.S. Agency for International Development
U.S. Naval Academy
Utah State University
Virginia Polytechnic and State University
Western Human Nutrition Research Center, Agricultural
Research Service, United States Department
of Agriculture
Winrock International
Woodrow Wilson International Center for Scholars
World Resources Institute

COLLABORATING INTERNATIONAL AND REGIONAL ORGANIZATIONS

Asian Development Bank
Asian Vegetable Research and Development Centre
Association for Strengthening Agricultural Research in East and Central Africa
CARE International
Caribbean Agricultural Research and Development Institute
Centro Internacional de Agricultura Tropical
Centro Internacional de la Papa
Centro Internacional de Mejoramiento de Maíz y Trigo
Consultative Group on Assisting the Poorest
Eastern and Central Africa Program for Agricultural Policy Analysis
European Association of Non-Governmental Organisations for Food Aid and Emergency Aid (EuronAid)
Food and Agriculture Organization of the United Nations
ICLARM—The World Fish Centre
Inter-American Development Bank
Interamerican Institute for Cooperation in Agriculture
International Association for the Study of Common Property
International Center for Agricultural Research in the Dry Areas
International Center for Research on Women
International Centre for Diarrhoeal Disease Research
International Centre for Research in Agroforestry
International Crops Research Institute for the Semi-Arid Tropics
International Fertilizer Development Center
International Institute of Tropical Agriculture
International Livestock Research Institute
International Monetary Fund
International Plant Genetic Resources Institute
International Rice Research Institute
International Service for National Agricultural Research
International Training Centre
International Water Management Institute
Micronutrient Initiative
Network of Institutions Dedicated to Teaching Agricultural and Rural Development Policies for Latin America and the Caribbean (REDCAPA)
North American Agricultural Economics Association
Population Council
Sécurité Alimentaire Durable en Afrique de l'Ouest Centrale
Southern Africa Development Community
Sustainable Food Security in Central West Africa
United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition
United Nations Development Programme
United Nations Economic and Social Commission for Asia and the Pacific
United Nations Educational, Scientific, and Cultural Organization
World Bank
World Food Programme
World Meteorological Organization
World Trade Organization

PUBLICATIONS

PUBLICATIONS, 2000

RESEARCH REPORTS

Number 111

Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis, by Lisa C. Smith and Lawrence Haddad.

Number 112

Urban Livelihoods and Food and Nutrition Security in Greater Accra, Ghana, by Dan Maxwell, Carol Levin, Margaret Armar-Klemesu, Marie Ruel, Saul Morris, and Clement Ahiadeke.

Number 113

A Meta-Analysis of Rates of Return to Agricultural R&D: Ex Pede Herculem?, by Julian Alston, Connie Chan-Kang, Michele Marra, Philip G. Pardey, and TJ Wyatt.

Number 114

Rice Market Liberalization and Poverty in Viet Nam, by Nicholas Minot and Francesco Goletti.

Number 115

Wheat Policy Reform in Egypt: Adjustment of Local Markets and Options for Future Reform, by Mylène Kherallah, Hans Löfgren, Peter Gruhn, and Meyra Mendoza.

Policy implications of each research report are summarized in the *IFPRI Abstract* series, which is published in English, French, and Spanish.

IFPRI/JOHNS HOPKINS UNIVERSITY

PRESS BOOKS

Out of the Shadow of Famine: Evolving Food Markets and Food Policy in Bangladesh, edited by Raisuddin Ahmed, Steven Haggblade, and Tawfiq-e-Elahi Chowdhury.

OTHER BOOKS AND REPORTS

Agriculture in Tanzania since 1986: Follower or Leader of Growth?, by Christopher Delgado and Nicholas Minot. Published in collaboration with the Government of the United Republic of Tanzania and the World Bank.

Feeding Minds, Fighting Hunger Curriculum. Published in collaboration with nine other organizations, including FAO, UNESCO, the World Bank, and the Peace Corps. (Available in Arabic, English, French, and Spanish on the web; available in English in print.)

Food Policy Reforms in Central Asia: Setting the Research Priorities, edited by Suresh Babu and Alisher Tashmatov.

Fourth Report on the World Nutrition Situation: Nutrition throughout the Life Cycle. Published in collaboration with the United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition. A 4-page *Highlights: The Fourth Report on the World Nutrition Situation* was also published.

Negotiating Water Rights, edited by Bryan Randolph Bruns and Ruth S. Meinzen-Dick. Published in collaboration with Intermediate Technology Publications and Vistaar Publications.

Pilot Analysis of Global Ecosystems: Agroecosystems, by Stanley Wood, Kate Sebastian, and Sara J. Scherr. Published in collaboration with World Resources Institute.

Property Rights, Risk, and Livestock Development in Africa, edited by Nancy McCarthy, Brent Swallow, Michael Kirk, and Peter Hazell. Published in collaboration with the International Livestock Research Institute.

Roots and Tubers in the Global Food System: A Vision Statement to the Year 2020, by G. J. Scott, R. Best, Mark W. Rosegrant, and M. Bokanga. Published in collaboration with CIP, CIAT, IITA, and IPGRI.

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25 Years of Food Policy Research, by Per Pinstrup-Andersen.

FOOD POLICY REPORTS

The Road Half Traveled: Agricultural Market Reform in Sub-Saharan Africa, by Mylène Kherallah, Christopher Delgado, Eleni Gabre-Madhin, Nicholas Minot, and Michael Johnson.

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A 2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

News & Views (newsletter), April, September, and December (English and Spanish).

Focus Briefs

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Achieving Urban Food and Nutrition Security in the Developing World, edited by James L. Garrett and Marie T. Ruel (ten briefs, English and Spanish).

Focus 4

Promoting Sustainable Development in Less-Favored Areas, edited by John Pender and Peter Hazell (nine briefs, English and Spanish).

Discussion Papers

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Briefs

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Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices, by Lisa C. Smith and Lawrence Haddad (English, French, and Spanish).

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Number 66

Roots and Tubers for the 21st Century: Trends, Projections, and Policy Options, by Gregory J. Scott, Mark W. Rosegrant, and Claudia Ringler (English, French, and Spanish).

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Smith, Lisa (with A. El Obeid and H. H. Jensen). The Geography and Causes of Food Insecurity in Developing Countries. *Agricultural Economics* 22 (No. 2).

Smith, Lisa (with H. Pachon and C. del Ninno). Intrahousehold Food Distribution in the Aftermath of the 1998 Floods in Bangladesh. *Federation of American Societies for Experimental Biology (FASEB) Journal* 14 (No. 4).

Wobst, Peter. Why the Poor Care about Partial versus General Equilibrium Effects. Part 1: Methodology and Country Case. In *Proceedings of the Conference on Tropical and Subtropical Agriculture and Forestry*. Hohenheim, Germany: University of Hohenheim.

SPECIAL REPORTS

Agricultural Sector Program Review—Phase I. Prepared by Francesco Goletti and Nicholas Minot for the Asian Development Bank.

Agricultural Sector Program Review—Phase II. Prepared by Francesco Goletti, Nicholas Minot, C. Adamson, J. Dennis, D. Hopkins, J. Keddie, and D. Moles for the Asian Development Bank.

Agricultural Sector Program Review—Phase III. Prepared by Francesco Goletti and Nicholas Minot for the Asian Development Bank.

Agro-based Industrialization in Bangladesh: Prospects, Constraints, and Policy Issues. Prepared by Raisuddin Ahmed and Shahidur Rashid for the U.S. Agency for International Development.

Assets and Rural Poverty. Prepared by J. Hoddinott, Lawrence Haddad, and Sanjukta Mukherjee for the International Fund for Agricultural Development.

The Debate Over Dynamics of Agricultural Wage and Rice Price in Bangladesh: A Re-examination in Cointegration Framework. Prepared by Shahidur Rashid for the U.S. Agency for International Development.

Emprego nas Zonas Urbanas de Moçambique. Prepared by C. Massingarella, James Garrett, and Ken Simler for the Ministry of Planning and Finance, Mozambique.

Food Policy and Nutrition Security (revised). Prepared by Suresh Babu for the Asian Development Bank.

The Impact of PROGRESA on Consumption. Prepared by J. Hoddinott, Emmanuel Skoufias, and R. Washburn for the Government of Mexico.

The Impact of PROGRESA on Women's Status and Intrahousehold Relations. Prepared by Michelle Adato, B. de la Brière, D. Mindek, and Agnes R. Quisumbing for the Government of Mexico.

The Impacts of Standards on the Food Sector of Kenya. Prepared by Mylène Kherallah and Michigan State University staff for the U.S. Agency for International Development, Global Mission and Africa Bureau.

The Incidence of Public Spending on Education, Health, and Infrastructure in Mozambique. Prepared by V. Nhate, C. Matusse, G. Dava, R. Heltberg, F. Tarp, and Ken Simler for the African Economic Research Consortium.

A Method for Estimating Welfare in Mozambique from the QUIBB Survey. Prepared by Ken Simler and C. Massingarella for the Ministry of Planning and Finance, Mozambique.

Multicountry Synthesis Report on Institutional Analysis, Vol. 3.
Prepared by C. Lapenu, M. Zeller, and Manohar Sharma for the
Federal Ministry for Economic Cooperation and Development,
Germany.

*Operational Evaluation of the Community Day Care Program of
Guatemala.* Prepared by Marie T. Ruel, B. de la Brière, and Kelly
Hallman for the Ministry of Social Works of the First Lady of
Guatemala.

*An Operations Evaluation of PROGRESA from the Perspective
of Beneficiaries, Promotoras, School Directors, and Health Staff.*
Prepared by Michelle Adato, David Coady and Marie T. Ruel for
the Government of Mexico.

*Participation and Poverty Reduction: Issues, Theory, and New
Evidence from South Africa.* Prepared by J. Hoddinott, Michelle
Adato, T. Besley, and Lawrence Haddad for the World Bank.

*Policy Options for Using Livestock to Promote Rural Income
Diversification and Growth in Viet Nam: Preliminary Findings and
Recommendations.* Prepared by Francesco Goletti, D. Smith, and
Peter Gruhn for the Royal Embassy of Denmark (Hanoi) and the
Ministry of Agriculture and Rural Development, Viet Nam.

*A Positive Deviance Approach to Studying Child Feeding Practices
and Care in Accra, Ghana.* Prepared by M. Armar-Klemesu and
Marie T. Ruel for Food and Nutrition Technical Assistance.

*Priorities of Public Investment in Rural China: A Country-Level
Analysis.* Prepared by Shenggen Fan, L. Zhang, Xiaobo Zhang,
and X. Ma for the Australian Centre for International Agricultural
Research.

*Public Expenditure Review: Input on the Agricultural and Rural
Sectors.* Prepared by Mylène Kherallah and Francesco Goletti for
the World Bank.

*Returns to Investment in Less-Favored Areas in Developing
Countries: A Synthesis of New Evidence.* Prepared by Shenggen
Fan for the World Bank.

*Tailoring Services for Clients: Household-Level
Considerations in Rural Financial Policies.* Prepared by
Manohar Sharma, M. Zeller, and C. Lapenu for the
Federal Ministry for Economic Cooperation and
Development, Germany.

FINANCIAL STATEMENTS

Presented here is a summary of financial information for the years ended December 31, 2000 and 1999.

The full financial statements and the independent auditors' report are available from IFPRI on request.

BALANCE SHEETS

December 31, 2000 and 1999 (US\$ thousands)

ASSETS		2000	1999
Current assets	Cash and cash equivalents	\$ 6,417	\$ 7,372
	Investments	1,860	2,121
	CGIAR grants receivable	503	721
	Restricted projects receivable (net)	2,824	1,913
	Other receivables	550	299
	Other current assets	313	290
	Total current assets	12,467	12,716
Other assets	Investments—long term	5,685	4,683
	Property and equipment, net	557	666
Total assets		\$ 18,709	\$ 18,065

LIABILITIES AND NET ASSETS

Current liabilities	Accounts payable	\$ 1,200	\$ 647
	Accrued vacation	660	614
	Advance payment of CGIAR grant funds	—	2,475
	Deferred rent (current portion)	—	—
	Unexpended restricted project funds	7,589	6,365
	Other liabilities	17	18
	Total current liabilities	\$ 9,466	\$ 10,119
Noncurrent liabilities	Deferred rent	879	737
	Accrued post-retirement benefits	556	507
	Total noncurrent liabilities	1,435	1,244
Total liabilities		10,901	11,363
Net assets—unrestricted	Operating reserves	4,001	3,569
	Reserves allocated for subsequent year expenditure	3,250	2,467
	Net investment in property and equipment	557	666
	Total net assets	7,808	6,702
	Total liabilities and net assets	\$ 18,709	\$ 18,065

STATEMENTS OF REVENUE, EXPENSES, AND CHANGES IN OPERATING RESERVES

For the Years Ended December 31, 2000 and 1999 (US\$ thousands)

REVENUE		2000	1999
Grant and contract income			
	Unrestricted	\$ 8,566	\$ 9,038
	Restricted	13,270	11,643
Investment income		866	533
Total revenue		\$ 22,702	\$ 21,214
EXPENSES			
Program services			
	Direct research and outreach	\$ 18,233	\$ 17,258
	Other services	191	170
Management and general		3,172	2,508
Total expenses		\$ 21,596	\$ 19,936
Excess of revenue over expenses		\$ 1,106	\$ 1,278
Transfer (to) from reserves allocated for subsequent year expenditure		(566)	(712)
Transfer (to) from net investment in property and equipment		(108)	32
Increase (decrease) in working capital fund		\$ 432	\$ 598
Operating reserves, beginning of year		3,569	2,971
Operating reserves, end of year		\$ 4,001	\$ 3,569

SCHEDULE OF EXPENSES BY TYPE (US\$ thousands)

EXPENSES	2000	1999
Personnel	\$ 6,484	\$ 5,868
Fringe benefits	3,746	3,526
Collaboration/field expenses	4,501	4,432
Travel	1,536	1,648
Computer	439	324
External publications	539	382
Trustees' expenses (nontravel)	127	56
Office operations	3,261	3,172
Foreign exchange loss (gain)	659	252
Depreciation/amortization	304	276
Total	\$ 21,596	\$ 19,936

IFPRI BOARD OF TRUSTEES

IFPRI BOARD OF TRUSTEES, 2000–2001

Geoff Miller, Chair

Principal
GCM Strategic Services Pty. Ltd.
Chatswood, Australia

Rebeca Grynspan Mayufis, Vice Chair

Former Vice President of Costa Rica
Economics Consultant
San José, Costa Rica

Isher Judge Ahluwalia

Director and Chief Executive
Indian Council for Research on International
Economic Relations
New Delhi, India

Baba Dioum

Coordinator General
Conference of West and Central African
Ministers of Agriculture
Dakar, Senegal

Wenche Barth Eide

Professor, Institute for Nutrition Research,
School of Nutrition
University of Oslo
Oslo, Norway

Arie Kuyvenhoven

Professor, Department of Social Sciences
Wageningen University
Wageningen, the Netherlands

Susumu Matsuoka

CEO
Japan FAO Association
Tokyo, Japan

Solita Collas Monsod

Professor of Economics
University of the Philippines
Quezon City, the Philippines

Benno Ndulu

Lead Specialist
The World Bank
Dar-es-Salaam, Tanzania

Sylvia Ostry

Distinguished Research Fellow
Centre for International Studies, University of Toronto
Toronto, Canada

Per Pinstrup-Andersen

Director General, Ex Officio

G. Edward Schuh

Orville and Jane Freeman Professor of International
Trade and Investment Policy
University of Minnesota
Minneapolis, Minnesota, U.S.A.

Frances Stewart

Professor and Director
Queen Elizabeth House, International
Development Centre, Oxford University
Oxford, United Kingdom

Wen Simei

Professor and Director
Institute of Economic Development, South China
Agricultural University
Guangzhou, People's Republic of China

Roberto Vazquez Platero

Chairman
National Meat Institute
Montevideo, Uruguay

Left to right standing:

*Wenche Barth Eide, Frances Stewart, G. Edward Schuh, Sylvia Ostry, Isher Judge Ahluwalia,
Wen Simej, Susumu Matsuoka*

Left to right seated:

*Roberto Vazquez Platero, Benno Ndulu, Baba Dioum, Geoff Miller, Per Pinstруп-Andersen,
Rebeca Grynspan Mayufis, Arie Kuyvenhoven*

Not pictured:

Solita Collas Monsod

PERSONNEL

List reflects personnel employed by IFPRI as of December 31, 2000, and includes part-time staff members. Country indicates citizenship of staff member.

DIRECTOR GENERAL'S OFFICE

Director General

Per Pinstруп-Andersen, Denmark

Research Fellow Emeritus

Nurul Islam, Bangladesh

Special Assistants to the Director General

Marc Cohen, U.S.A.

Stacy Roberts, U.S.A.

Senior Research Assistant

Julie Babinard, France

Executive Secretary to the Director General

Edith Yalong, Philippines

Graphics Specialist

Vickie Lee, Philippines

2020 Vision for Food, Agriculture, and the Environment Initiative

Head

Rajul Pandya-Lorch, Kenya

Coordinator, 2020 Vision Network for East Africa

Fred Opi, Uganda (outposted to Uganda)

Research Analyst

Simon Bolwig, Denmark (outposted to Uganda)

Administrative Coordinator

Jenna Kryszczun, U.S.A.

RESEARCH AND OUTREACH

Environment and Production Technology Division

Director

Peter Hazell, United Kingdom

Senior Research Fellows

Shenggen Fan, China

Ruth Meinzen-Dick, U.S.A.

Philip Pardey, Australia

Mark Rosegrant, U.S.A.

Senior Scientists

Stanley Wood, United Kingdom

Liang You, China

Research Fellows

Nabil Chaherli, Tunisia (outposted to Syria)

Junichi Ito, Japan

Nancy McCarthy, U.S.A.

Tidiane Ngaido, Senegal (outposted to Kenya)

John Pender, U.S.A.

Postdoctoral Fellows

Ximing Cai, China

Bonwoo Koo, Republic of Korea

Ephraim Nkonya, Tanzania (outposted to Uganda)

Charles Rodgers, U.S.A. (outposted to Indonesia)

Xiaobo Zhang, China

Visiting Research Fellows

Joel Cohen, U.S.A.

Sivramiah Shantharam, India

Melinda Smale, U.S.A.

Research Analysts

Nienke Beintema, Netherlands

Connie Chan-Kang, Canada

Anna Knox, U.S.A.

Claudia Ringler, Germany (outposted to Viet Nam)

IFPRI IN THE FIELD

Senior Research Assistants

Monica di Gregorio, Italy and Germany
Pamela Jagger, Canada
Siet Meijer, Netherlands
Neetha Rao, India
Patricia Zambrano, Colombia

Research Assistant

Michael Paisner, U.S.A.

Senior Administrative Coordinator

Patty Arce, Honduras

Administrative Coordinators

Maria Esteban, Philippines
Beryl Hackett-Perez, United Kingdom
Christina Quintos, Philippines

Word Processing Specialists/Program Assistants

Kathleen Flaherty, U.S.A.
Ann Gloria, Philippines

Food Consumption and Nutrition Division

Director

Lawrence Haddad, United Kingdom

Senior Research Fellows

Howarth Bouis, U.S.A.
Rafael Flores, Guatemala
Agnes Quisumbing, Philippines
Emmanuel Skoufias, Greece

Research Fellows

Michelle Adato, U.S.A.
Akhter Ahmed, Bangladesh
Todd Benson, U.S.A. (outposted to Malawi)
David Coady, Ireland
Carlo del Ninno, Italy (outposted to Bangladesh)
James Garrett, U.S.A.
Stuart Gillespie, United Kingdom
Kelly Hallman, U.S.A.
John Maluccio, U.S.A.
Saul Morris, United Kingdom
Pedro Olinto, U.S.A. (outposted to Honduras)
Marie Ruel, Canada
Kenneth Simler, U.S.A. (outposted to Mozambique)
Lisa Smith, U.S.A.

Research frequently takes IFPRI staff away from their offices in Washington, D.C., and into the field, but IFPRI also posted 13 staff members to developing countries as part of collaborative projects with institutions in those countries. IFPRI staff living and working in Bangladesh, Honduras, Indonesia, Kenya, Malawi, Mozambique, Syria, Uganda, and Viet Nam were able to interact closely and intensively with collaborators. From their posts in the field, these staff got a different view of research problems and had regular opportunities to share their skills in policy research and analysis in these developing countries.

Postdoctoral

Fellows

Sanzidur Rahman,
Bangladesh
(outposted to
Bangladesh)
Manohar Sharma, Nepal

Visiting Research Fellows

Calogero Carletto, Italy
Aliou Diagne, Senegal

Communications Specialist

Bonnie McClafferty, U.S.A.

Research Analysts

Sanjukta Mukherjee, India
Oscar Neidecker-Gonzales, Honduras
Ellen Payongayong, Philippines
Yisehac Yohannes, Ethiopia

Senior Research Assistant

Wahidur Quabili, Bangladesh

Senior Administrative Coordinator

Lynette Aspillera, Philippines

Administrative Coordinators

Celine Castillo-Macy, U.S.A.
Lourdes Hinayon, Philippines
Marie Hoffman, U.S.A.
Ginette Mignot, Canada
Marinella Yadao, Philippines

Senior Word Processing Specialist

Jay Willis, U.S.A.

Markets and Structural Studies Division

Director

Raisuddin Ahmed, Bangladesh

Senior Research Fellows

Christopher Delgado, U.S.A.

Paul Dorosh, U.S.A. (outposted to Bangladesh)

Francesco Goletti, Italy

Research Fellows

Mylène Kherallah, Lebanon

Nicholas Minot, U.S.A.

Postdoctoral Fellows

Eleni Gabre-Madhin, Ethiopia

Shahidur Rashid, Bangladesh

Research Analysts

Philippe Berry, France

Peter Gruhn, Canada

Senior Administrative Coordinator

Elizabeth Daines, U.S.A.

Administrative Coordinator

Janet Herrlinger, U.S.A.

Word Processing Specialists/Program Assistants

Diana Flores, Guatemala

Trade and Macroeconomics Division

Director

Sherman Robinson, U.S.A.

Research Fellows

Xinshen Diao, China

Eugenio Díaz-Bonilla, Argentina

Hans Löfgren, Sweden

Postdoctoral Fellows

Rebecca Harris, U.S.A.

Anne-Sophie Robilliard, France

Peter Wobst, Germany

Visiting Research Fellows

Samuel Morley, U.S.A.

Lucio Reca, Argentina

Research Analysts

Moataz El-Said, Egypt

Valeria Piñeiro, Argentina

Marcelle Thomas, U.S.A.

Research Assistant

Yukitsugu Yanoma, Japan

Senior Administrative Coordinator

María Cohan, Argentina

Word Processing Specialist/Program Assistant

Florence Meria, Kenya

Visiting Researchers

Some 150 visitors spent time at IFPRI in 2000.

Those listed here spent about a month or more at IFPRI.

Daniel Alker, University of Hohenheim, Germany

Margaret Armar-Klemesu, Noguchi Memorial Institute for
Medical Research, University of Ghana

Axel Borchgrevink, Norwegian Research Council

Eduardo Castelo-Magalhães

Jennifer Chung-I-Li, University of North Carolina at Chapel Hill

Bjorn Colding, University of Maryland, U.S.A.

Simeon Ehui, International Livestock Research Institute

Ole Hels, Royal Veterinary and Agricultural
College, Denmark

Jiang Hu, Johns Hopkins University, U.S.A.

Richard Kachule, Bunda College of Agriculture, Malawi

Ahmed Kamaly, University of Maryland

Johan Kirsten, University of Pretoria, South Africa

Magnus Lindelow, St. Anthony's College, Oxford, U.K.

Abm Nasir, University of Wisconsin, Milwaukee, U.S.A.

Chantal Nielsen, Danish Institute of Agricultural and
Fisheries Economics (SJFI), and University of
Copenhagen

Sjamsu Rahardja, Georgetown University, U.S.A.

Bio Goura Soule, Laboratoire d'Analyse et d'Expertise
Sociale, Benin

Sukhadao Thorat, Jawaharlal Nehru University, India

2000 AWARDS TO IFPRI STAFF

Zoe Vantzios, Johns Hopkins School of Advanced
International Studies, U.S.A.
Wei Wang, George Washington University, U.S.A.
Linxiu Zhang, Centre for Chinese Agriculture Policy, China

Communications Division

Director

Klaus von Grebmer, Switzerland

Senior Administrative Coordinator

Beverly Abreu, U.S.A.

Editorial Services

Senior Editors

Heidi Fritschel, U.S.A.

Uday Mohan, U.S.A.

Publications Services

Communications Specialist

Evelyn Banda, U.S.A.

Desktop Publishing Specialist

Lucy McCoy, U.S.A.

Administrative Coordinator

Corinne De Gracia, France

Publications Assistant

Shereese Lawson, U.S.A.

Information Clerk

Marie Aspillera, Philippines

Knowledge Management and Library

Head Librarian

Luz Marina Alvaré, Colombia

Library Clerical Assistant

Amanda Segovia, Philippines

Policy Seminars

Head

Laurie Goldberg, U.S.A.

Meetings/Conference Coordinator

Simone Hill Lee, U.S.A.

The Board of Trustees of the International Livestock Research Institute (ILRI) presented the Neville Clark Award for Partnership and Teamwork to a joint IFPRI-ILRI team examining land management policies. The award is given to partnerships that make significant contributions to ILRI's goals. John Pender, Peter Hazell, and Pamela Jagger formed the IFPRI team.

Suresh Babu received the Outstanding Young Alumnus Award from Iowa State University, U.S.A.

Ellen Payongayong received the Outstanding Local Scientific Support Staff Award, one of five annual awards given by the CGIAR Chair.

Per Pinstrup-Andersen was named a Distinguished Fellow of the American Agricultural Economics Association. He received the Danish Agronomy Prize and an honorary doctorate from Wageningen University and Research Centre.

Media Relations and Internal Communications

Senior Communications Specialist

Michael Rubinstein, U.S.A.

Communications Specialist

David Gately, U.S.A.

Training and Capacity-Strengthening Program

Senior Research Fellow and Senior Training Adviser

Suresh Babu, India

Senior Research Assistant

Valerie Rhoe, U.S.A.

Program Assistant

Brenda Clark, U.S.A.

SUPPORT

Finance and Administration

Director

Martin Van Weerdenburg, Australia

Senior Administrative Coordinator

Bernadette Cordero, Philippines

Travel Coordinator

Luisa Gaskell, Philippines

Program Assistant

Angelica Santos, Philippines

Computer Services

Head

Nancy Walczak, U.S.A.

Senior Information Technology Professional

Kang Chiu, China

Information Technology Professional

Aamir Qureshi, Pakistan

Information Technology Support

Julian Lawrence, U.S.A.

Kwong Hii, Malaysia

Facilities and Office Services

Head

Anthony Thomas, U.S.A.

Program Assistant

Yolanda Palis, Philippines

Facilities Assistants

Glen Briscoe, U.S.A.

Melvin Suggs, U.S.A.

Receptionist

Rosa Gutierrez, U.S.A.

Finance

Controller

Thuan Huynh, U.S.A.

Chief Accountant

German Gavino, U.S.A.

Staff Accountants

Howard Lee, U.S.A.

Paulina Manalansan, Philippines

Orlan Wilson, U.S.A.

Human Resources

Head

I'dafney Green, U.S.A.

Senior Human Resource Generalist

Sandra Freeman, U.S.A.

Human Resource Assistant

Zeynep Borcbakan, Turkey

FUTURE HARVEST

FUTURE HARVEST

IFPRI IS ONE OF 16 agricultural research organizations known as the Future Harvest centers. The centers, located around the world, conduct research in partnership with farmers, scientists, and policymakers to help alleviate poverty and increase food security while protecting the natural resource base. They are principally funded through the 58 countries, private foundations, and regional and international organizations that make up the Consultative Group on International Agricultural Research (CGIAR).

In 1998 the centers supported by the CGIAR created Future Harvest as a charitable and educational organization designed to advance the debate on how to feed the world's growing population without destroying the environment and to catalyze action for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest reaches out to media, academics, scholars, and scientists in the world's premier peace, environment, health, population, and development

research organizations, as well as policymakers and civil society, and it enlists world-renowned leaders to speak on its behalf. Future Harvest supports research, promotes partnerships, and sponsors on-the-ground projects that bring the results of research efforts to farmers' fields in Africa, Asia, and Latin America. For more information on Future Harvest, go to www.futureharvest.org.



FUTURE HARVEST CENTERS

CIAT—Centro Internacional de Agricultura Tropical

CIFOR—Center for International Forestry Research

CIMMYT—Centro Internacional de Mejoramiento de Maíz y Trigo

CIP—Centro Internacional de la Papa

ICARDA—International Center for Agricultural Research in the Dry Areas

ICLARM—The World Fish Center

ICRAF—International Centre for Research in Agroforestry

ICRISAT—International Crops Research Institute for the Semi-Arid Tropics

IFPRI—International Food Policy Research Institute

IITA—International Institute of Tropical Agriculture

ILRI—International Livestock Research Institute

IPGRI—International Plant Genetic Resources Institute

IRRI—International Rice Research Institute

ISNAR—International Service for National Agricultural Research

IWMI—International Water Management Institute

WARDA—West Africa Rice Development Association

DONORS

DONORS, 2000

Asian Development Bank	Italy
Australia	Japan
Brazil	MacArthur Foundation
Canada	Malawi
CARE	Mexico
China	Mozambique
Denmark	Netherlands
European Commission	Neys-Van Hoogstraten Foundation
Finland	Nicaragua
Ford Foundation	Norway
France	Philippines
Germany	Rockefeller Foundation
Honduras	Spain
India	Sweden
Inter-American Development Bank	Switzerland
International Fund for Agricultural Development	United Kingdom
Ireland	United Nations Children's Fund (UNICEF)
Istituto di Studi Economici e Sociali (SICHELGAITA)	United States
	United States Department of Agriculture
	World Bank
	World Meteorological Organization