FOOD AID AND FOOD SECURITY TRENDS:
Worldwide Needs, Flows, and Channels[1]

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INTRODUCTION

In 1995, the International Food Policy Research Institute (IFPRI) launched its initiative on a 2020 Vision for Food Agriculture, and the Environment. The vision is one of a food secure, malnutrition-free world by the year 2020 – a world in which every person is assured access at all times to the food required to lead a healthy and productive life. During the past 25 years, food production has consistently kept pace with population growth, and since the early 1960s, food availability per person has increased by almost 20 percent. Nevertheless, nearly 800 million people in developing countries – a population double that of the European Union – lack access to a minimally adequate diet. More than a billion people suffer from vitamin and mineral deficiencies. Food insecurity and malnutrition result in needless child deaths, serious public health problems, and lost human potential in the developing countries. This paper will look at the current food security situation, the outlook to 2020, policy changes that will be needed if the 2020 Vision is to be realized, and the role that food aid can play.

CURRENT FOOD SECURITY SITUATION AND OUTLOOK TO 2020

Access to Food and Food Utilization

According to the latest World Bank data, about 1.2 billion people, or one of every five humans, lives in a state of absolute poverty, on the equivalent of US$1 a day or less. A majority (56 percent) of the people in the developing countries – 2.8 billion in all -- subsist on $2 per day or less.[3] Poverty is the main cause of food insecurity, as poor people frequently cannot afford to buy all the food they need, and do not have access to land to produce it. Moreover, poor people devote a considerable share of their limited

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[3] Data posted at http://www.worldbank.org/poverty/data/trends/income.htm, accessed 10/15/99.

resources to obtaining food: whether in rural or urban areas, people living in poverty spend as much as 50–70 percent of their incomes on food (Figure 1).[4]

According to the Food and Agriculture Organization of the United Nations (FAO), about 790 million people in developing countries lacked adequate access to food in 1995-97, the last period for which data are available. This represented 18 percent of the population of the developing world (Tables 1 and 2). Both the absolute number and the proportion of undernourished people in the developing world have declined steadily, if slowly, since 1969-71, when the figures stood at 960 million people and 37 percent. FAO estimates that an additional 34 million people in industrialized and transition countries presently suffer from chronic undernutrition.[5]

Throughout the period between 1969-71 and 1995-97, the majority of undernourished people lived in the greater Asia-Pacific region. But while East and Southeast Asia dramatically reduced both the numbers and proportion of undernourished people, in South Asia, the number of undernourished people increased, even as the proportion dropped significantly, due to the persistence of poverty, rapid population growth, and failure to make food security a high policy priority. The latest FAO data do not cover the Asian economic crisis of the late 1990s, which caused increased poverty and food insecurity in many countries that had made progress in previous decades.

In Sub-Saharan Africa, the undernourished population doubled during the same period, while the undernourished percentage of the total population remained flat. Widespread poverty, environmental degradation, declining food production per capita, and violent conflict all contribute to food insecurity in this region.

FAO projects that the developing world's food insecure population will fall to 680 million by 2010, with the proportion declining to 12 percent. Food insecurity is likely to increase in Sub-Saharan Africa and the Middle East, even as it declines in other regions. By 2010, 70 percent of food insecure people will live in Sub-Saharan Africa and South Asia, with one of every three Africans undernourished.[6] If the international community continues with business as usual, it will fall far short of realizing the 1996 World Food Summit goal of reducing chronic undernutrition by half by no later than 2015.

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[4] Angus Deaton, *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy* (Baltimore and London: Johns Hopkins University Press for The World Bank, 1997).

[5] Food and Agriculture Organization of the United Nations, *The State of Food Insecurity in the World 1999* (Rome: FAO, 1999); FAO, "The State of Food and Agriculture," posted at www.fao.org/docrep/meeting/X3150e.htm, accessed November 23, 1999.

[6] FAO, *Food, Agriculture, and Food Security: Developments Since the World Food Conference and Prospects, World Food Summit Technical Background Document* No. 1 (Rome: FAO, 1996).

Malnutrition among preschool children is of particular concern. The World Health Organization (WHO) estimates that it is a factor in 49 percent of all deaths of children under the age of five in the developing world. In 1995, this death toll came to 5.1 million preschoolers, roughly equivalent to Denmark's population.[7] Malnourished children who make it to their fifth birthdays often suffer stunted physical and mental development. WHO estimates that in 1995, there were about 160 million malnourished preschoolers in developing countries (29 percent of the children under five). A majority (51 percent) lived in South Asia.[8] Low birth weight is a major contributor to child malnutrition. About one in four children in developing countries are born with low birth weights, usually as a result of poor maternal nutrition both before conception and during pregnancy. In effect, one generation passes its malnutrition to the next.[9]

IFPRI's International Model for Policy Analysis of Commodities and Trade (IMPACT)[10] projects that by 2020, the number of malnourished preschoolers in the developing world will fall only slightly to 135 million (25 percent of the total) (Figure 2). Child malnutrition is expected to decline in all regions except Sub-Saharan Africa, where it is projected to rise by up to 30 percent. By 2020, 77 percent of malnourished children will be found in Africa and South Asia. The expected decline in child malnutrition over 1990-2020 will not reach 25 percent. Yet in 1990,

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[7] World Health Organization, "Malnutrition Worldwide," posted at www.who.int/nut/, accessed 9/29/99.

[8] United Nations Administrative Committee on Coordination/Subcommittee on Nutrition and IFPRI, *Fourth Report on the World Nutrition Situation,* Draft 1, July 1999 (Geneva: ACC/SCN and Washington: IFPRI).

[9] *Ibid*.

[10] IMPACT is a partial equilibrium model of the global food economy. It divides the world into 37 countries and regions that account for virtually all of food production and consumption, and covers 18 major agricultural commodities. IMPACT generates long-term projections of global food demand, supply, and trade as well as child malnutrition. Work is presently underway on integrating water into the model. The base data used in the current version are averages of the 1994–96 annual data from the FAO statistical database and WHO data on child malnutrition. Since each of the 37 country groups produces and/or consumes at least some of each commodity, thousands of supply and demand parameters are specified (income, price, and cross-price elasticities of demand; production parameters including crop area and yield growth trends; price response parameters; trade distribution parameters; and so forth). Parameter estimates are drawn from econometric analysis, assessment of past and changing trends, expert judgments, and synthesis of the existing literature. For a detailed description of the model see M. W. Rosegrant, M. Agcaoili-Sombilla, and N. D. Perez, *Global Food Projections to 2020: Implications for Investment*, 2020 Vision for Food, Agriculture, and the Environment Discussion Paper 5 (Washington, D.C.: International Food Policy Research Institute, 1995); M. W. Rosegrant and C. Ringler, "Asian Economic Crisis and the Long-Term Global Food Situation," paper prepared for the International Agricultural Trade Research Consortium Symposium, Alexandria, Virginia, U.S.A., June 26–27, 1998. Projections from July 1999 are reported here.

heads of state and government had pledged at the World Summit for Children to cut severe and moderate malnutrition among preschool children by half by 2000.[11]

A new IFPRI study finds four critical reasons why child nutrition improved in the developing world between 1970 and 1995: improvements in women's education accounted for almost 45 percent of the total reduction in child malnutrition, followed by improvements in per capita food availability, improvements in the health environment, and improvements in women's status relative to men (Figure 3). Investments in these four areas could significantly reduce child malnutrition, especially if coupled with improvements in national incomes and democracy. For Sub-Saharan Africa and South Asia, the "hot spots" of child malnutrition, improving per capita food availability and women's education offer the best hope for reducing child malnutrition in the future. Significantly, this study stresses that there is no quick and easy "magic bullet" for assuring that all children are well-nourished.[12]

Nutritionists generally agree that if a person takes in enough calories, he or she will also get the necessary protein. But this does not guarantee adequate intake of micronutrients B vitamins, minerals, and trace elements. According to the United Nations interagency Subcommittee on Nutrition (ACC/SCN), as much as 80 percent of humanity experiences iron deficiency. About 2 billion people suffer from anemia, usually due to inadequate dietary iron, including 48 percent of all pregnant women, 56 percent of pregnant women in developing countries, and 75 percent of pregnant South Asian women (Figure 4). Anemia can increase maternal and newborn mortality, impair child health and development, limit learning capacity, impair immune systems, and reduce work performance. Iron deficiency anemia is estimated to cost many developing countries over 1 percent of gross domestic product.[13] Nevertheless, high levels of iron deficiency anemia have persisted over the past two decades, and there are few high priority public health programs aimed at tackling this problem.[14]

Insufficient intake of vitamin A among children in developing countries is the leading cause of preventable severe visual impairment and blindness and contributes to infections and death. It is estimated that tens of thousands of children go blind each year in the developing world because of vitamin A deficiency, and a high percentage of those

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[11] UN Children's Fund *The State of the World's Children 1998* (New York: Oxford University Press, 1998).

[12] Lisa C. Smith and Lawrence Haddad, "Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices," *Food, Agriculture, and Environment Discussion Paper* No. 30 (Washington: IFPRI, 2000).

[13] ACC/SCN and IFPRI.

[14] WHO, "Malnutrition Worldwide."

children die.[15] Pregnant women who are vitamin A deficient face increased risk of mortality and mother-to-child HIV transmission. Programs to improve vitamin A intakes have focused on supplementation and fortification. Efforts to encourage increased consumption of vitamin A-rich vegetables have been less successful. Crop breeding efforts – using both conventional and transgenic methods – are underway to develop vitamin A-rich rice and cassava.[16]

Food Availability

On the supply side, cereal output is the key indicator, as cereals provide about 60 percent of dietary energy in developing countries, and the figure is even higher in the poorest countries.[17] According to FAO, world cereal production and carryover stocks were more than adequate to meet consumption requirements in 1999.

There are a number of less sanguine trends. Cereal production per capita declined in 1999 in the countries FAO has designated "low-income food deficit." Output of root and tuber crops (important in the diets of many poor people) stagnated.

Despite this mixed short-term picture, global food production remains more than sufficient to provide everyone with the required minimum number of calories if the available food were distributed according to needs. Food insecurity is less a problem of food availability than of access to food and food utilization.

There is likely to be a gap between food production and demand in several parts of the world by 2020. Demand is influenced by population growth and urbanization, as well as income levels and associated changes in dietary preferences.

According to United Nations projections, world population will reach 7.5 billion in 2020, an increase of 25 percent over the mid-1999 population of 6 billion. This means that, on average, 73 million people, equivalent to the current population of the Philippines, will be added each year. About 98 percent of the projected growth will take place in developing countries.[18]

Much of the population increase will take place in the cities of the developing world, where the urban population is expected to double. The urban proportion of the

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[15]ACC/SCN and IFPRI; ACC/SCN, *Third Report on the World Nutrition Situation* (Geneva: ACC/SCN, 1997).

[16] WHO, "Malnutrition Worldwide"; ACC/SCN and IFPRI.

[17]FAO, *The Sixth World Food Survey* (Rome: FAO, 1996).

[18]United Nations Population Division, *World Population Prospects: The 1998 Revision* (electronic version, 1998).

population will reach 52.[19] When people move to cities, they generally shift from diets based on roots, tubers, sorghum, millet, and maize to rice and wheat, which require less preparation time, and to more meat, milk, fruit, vegetables, and processed foods.

IMPACT projects increases in per capita income in all developing regions through 2020, but income inequality is likely to persist within and between countries. Poverty is likely to remain entrenched in South Asia and Latin America, and to increase considerably in Sub-Saharan Africa, where per capita income will be less than a dollar a day.

IMPACT forecasts a 39 percent increase in cereal demand between 1995 and 2020, and a 58 percent increase in meat demand. Almost all of these increases will come from the developing world (Figures 5 and 6). However, per capita demand for meat will continue to lag far behind that in developed countries (Figure 7). Strong meat demand will double developing countries' feedgrain demand (Figure 8). Demand for maize will overtake demand for rice by 2020 (Figure 9). To meet the demand increases, the world's farmers will have to produce 40 percent more grain, with 80 percent of the additional grain coming from yield increases rather than farmland expansion.

However, in both developed and developing countries, the rate of increase in cereal yields is slowing from 1970s levels. This is due partly to reduced use of inputs like fertilizer, reflecting low and falling cereal prices, and partly to low levels of investment in agricultural research and technology. Poorly functioning markets and lack of appropriate infrastructure and credit also contribute. The gap in average cereal yields between developed and developing countries is slowly narrowing, but it is widening considerably within the developing world, as Sub-Saharan Africa lags further and further behind other regions, particularly East Asia.

By 2020, developing countries will produce 59 percent of all cereal and 61 percent of all meat. But cereal production will not keep pace with demand. Developing countries' net cereal imports are projected to increase by 80 percent over 1995-2020, while net meat imports will jump more than eight fold.

With a 34 percent increase projected in its net cereal exports, the United States will continue to capture a large share of the increased cereal export market. But competition from the European Union, Eastern Europe, the former Soviet Union, and Australia will cut the U.S. market share in the net cereal exports of the developed world from 80 percent in 1995 to 60 percent in 2020. World Trade Organization (WTO) negotiations, changes in farm policies in the United States and European Union, and developments related to agricultural biotechnology may influence trade patterns.

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[19]United Nations Population Division, *World Urbanization Prospects: The 1996 Revision* (New York: United Nations, 1998).

Some poor countries, especially in Sub-Saharan Africa, are unlikely to be able to make up the difference between food demand and domestic production through commercial imports, due to poverty, foreign exchange constraints, and heavy debt burdens. Many millions of low-income people may not be able to afford the food they need, even if it is available in the marketplace.

IMPACT projects declining real world food prices between 1995 and 2020, but at much slower rates than in the past two decades (Figure 10), due to deceleration of crop yield increases, as well as strong growth in developing country demand for meat. Current low grain prices are causing large income losses among farmers in grain exporting countries, and domestic policy responses could further decrease production. A return to rapid economic growth in Asia would increase grain and livestock consumption and imports, as would improvements in the former Soviet economies.

IMPACT projections indicate that about 2,800 calories will be available per person per day in the developing world by 2020, up 9 percent over 1995, and more than adequate to meet minimum requirements for everyone. Increases in per capita food availability are expected in all regions. At less than 2,300 calories per person per day, average food availability in Sub-Saharan Africa will barely meet minimum requirements. Unequal distribution will keep many Africans from actually consuming the minimum.

CONSTRAINTS ON FUTURE FOOD SECURITY

A number of factors could significantly influence the outlook for the world food situation in the early years of the next century, including the impact of trade liberalization, declining development assistance, and natural resource management.

Impact of Trade Liberalization

In response to the 1994 Uruguay Round global trade agreement and structural adjustment programs enacted with the strong encouragement of aid donors, many developing countries have liberalized food and agricultural trade. Developed countries have not matched this with reciprocal liberalization efforts. Wealthy countries have been reluctant to open up their markets to imports from developing countries of high-value commodities such as beef, sugar, groundnuts, and dairy products.

In expected WTO agricultural trade negotiations, poor countries and poor people risk losing out on the economic benefits of further trade liberalization.[20] If they are to

[20] E. Díaz-Bonilla and S. Robinson, "Essay: Globalization, Trade Reform, and the Developing Countries," *IFPRI 1998* (Washington, D.C.: International Food Policy Research Institute, 1999); and E. Díaz-Bonilla and S. Robinson, eds., "Getting Ready for the Millennium Round Trade Negotiations," *2020 Vision Focus* 1 (Washington, D.C.: International Food Policy Research Institute, 1999).

gain, developing countries must participate effectively in the negotiations, pursuing better access to industrial countries' markets. They must also enact appropriate domestic economic and agricultural policies. The distribution of any benefits will be determined largely by the distribution of productive assets. In addition, many developing countries lack the administrative, scientific, legal, and infrastructural capacity to meet WTO requirements.[21]

As shown in Figure 11, the African share of world agricultural trade continues to decline rapidly. Research suggests that the net effect of current trade agreements will be adverse for most Sub-Saharan countries. The only real option for African and other low-income developing countries is to try to strengthen their bargaining position and pursue changes in both domestic policies and international trade arrangements:

- Domestic policy reforms that remove distortions adverse to small farmers and poor people while facilitating access to benefits from more open trade;
- Elimination of industrial countries' export subsidies, taxes, and controls that exacerbate global price fluctuations;
- Technical assistance and financial support for agriculture in low-income countries; and
- Strong sanitary and phytosanitary frameworks and technical support to help developing countries produce at developed country standards.[22]

Pie-Crust Promises at Marrakesh. WTO members recognized at the conclusion of the Uruguay Round negotiations that liberalization would likely lead to higher and/or more volatile prices, especially in the near-term, and that this might impose a severe adjustment burden on poor, food-importing countries. To address this, they agreed to the "Decision on Measures Concerning the Possible Negative Effects of the Reform Program on Least-Developed and Net Food-Importing Developing Countries," also known as the "Marrakesh Decision," after the city where the Agreement was signed. It commits developed country WTO members to provide compensation to poor food importing countries experiencing short-term negative consequences as a result of agricultural trade liberalization. It specifies such measures as adequate food aid, access to export credits, and increased financial and technical assistance to agriculture in the affected countries. The World Food Summit Plan of Action specifically calls upon WTO members to "fully implement" the Decision.

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[21] Food and Agriculture Organization of the United Nations, "Report on Technical Assistance Related to the Uruguay Round," Committee on Commodity Problems, 62nd session, January 12–15, 1999 (Rome: FAO, 1999).

[22] N. Mukherjee and R. L. Harris, "Getting Ready for the Millennium Round Trade Negotiations: African Perspective," 2020 Vision Focus 1, Brief 4 (Washington, D.C.: International Food Policy Research Institute, 1999).

The Decision has proved to be a "pie crust promise" – easily made, easily broken. Although it requires the WTO Committee on Agriculture to monitor follow-up, it fails to make any institution responsible for either determining whether trade liberalization has caused harm to the poor countries, or for assuring implementation of the compensatory measures. As a result, there has been much inconclusive debate ever since. Donor countries have limited any discussion of remedial measures to food aid, and even in this area, talks have proved indecisive.[23] Technical and financial assistance to developing country agriculture has declined dramatically.

Falling Aid

Official development assistance (ODA) declined by 17 percent in real terms, from an annual average of $64.6 billion between 1992 and 1994 to $53.8 billion during 1995-97. Reductions by the seven richest countries accounted for most of the decline, as other donors generally kept their assistance levels constant. Aid increased slightly in nominal terms in 1998, but remained well below the 1992-94 average.[24]

During the same period, aid to agriculture declined even more precipitously, falling 21 percent from a 1992-94 average of $9.5 billion to $7.5 billion a year over 1995-97. The decline from the average levels of 1986-88 was nearly 50 percent, and the share of aid to agriculture in total ODA fell from 25 percent to 14 percent.[25] A number of factors account for this steep reduction. First, as overall aid has fallen, the reduced resources have to accommodate a wide range of concerns. Second, many officials of donor and developing country governments alike view agriculture as a declining sector, and hence a low priority. This view ignores the potential of agricultural growth to promote overall equity and sustainable development in the poorest countries (see below). Third, complementary priorities, such as child survival, female education, microenterprise development, and environmental protection, all enjoy stronger domestic lobbies in donor countries. Finally, in the 1980s, donors worried that aid to agriculture would contribute to the perceived problem of excess supply.

Ironically, our research has found that aid to developing country agriculture not only is effective in promoting sustainable development and poverty alleviation, but it leads to increased export opportunities for developed countries as well, including,

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[23] U.S. General Accounting Office, *Food Security: Factors That Could Affect Progress Toward Meeting World Food Summit Goals*, GAO-NSIAD-99-15, March 1999, pp. 46-53.

[24] Organisation for Economic Co-operation and Development, *Development Co-operation 1999 Report* (Paris: OECD, 2000) and *1998 Report* (Paris: OECD, 1999); FAO, "State of Food and Agriculture."

[25] *Ibid.*

paradoxically, increased agricultural exports. More importantly, for many of the poorest developing countries, ODA is the only source of public investment in agriculture.[26]

Natural Resource Management

Management of natural resources will have a considerable impact on food security in 2020. Research can help identify policies and investments that can achieve food security and eradicate poverty in ways that protect natural resources, thereby breaking the vicious cycle of poverty, low productivity, and environmental degradation.

Soil fertility: Past and current failures to replenish soil nutrients in many countries must be rectified through balanced and efficient use of organic and inorganic plant nutrients and through improved soil management practices. Reduced use of chemical fertilizers is warranted in some locations because of negative environmental effects. It is critical that fertilizer use expand in countries where soil fertility is low and a large share of the population is food insecure. Fertilizer consumption in these countries is generally low because of high prices, insecure supplies, and the greater risk associated with food production in marginal areas. Average fertilizer consumption in Sub-Saharan Africa is 13 kilograms per hectare, compared with 259 kilograms per hectare in East Asia. Expanded African fertilizer use will help alleviate current production shortfalls as well as serious land degradation. Many low-income countries need a cost-effective fertilizer sector and policies providing incentives for farmers and communities to implement soil fertility programs.

Pest management: Pests are estimated to account for preharvest losses of 40 percent of the potential value of output, with an additional 10 percent of the potential value lost postharvest. In developing countries, the value of these losses greatly exceeds the level of aid to agriculture they have received in recent years.[27]

For small farmers in the developing countries, pesticides are often unaffordable, so the major crop protection interventions are traditional cultural practices, such as crop rotation. However, developing countries' share of the global pesticide market is expected to increase significantly during the early years of the 21st century. The insecticides now

[26]Per Pinstrup-Andersen, Mattias Lundberg, and James L. Garrett, *Foreign Assistance to Agriculture: A Win-Win Proposition – 2020 Vision Food Policy Report* (Washington: IFPRI, 1995); Per Pinstrup-Andersen and Marc J. Cohen, "Aid to Developing Country Agriculture: Investing in Poverty Reduction and New Export Opportunities, *2020 Brief* No. 56 (Washington: IFPRI, October 1998).

[27]E-C. Oerke, H-W. Dehne, F. Schonbeck, and A. Weber, *Crop Production and Crop Protection: Estimated Losses in Major Food and Cash Crops* (Amsterdam: Elsevier, 1994).

used in developing countries are often older, broad spectrum, acutely toxic compounds, many of which are now banned in developed countries except for export. [28]

Until recently, developing country governments and aid donors generally encouraged the used of chemical pesticides, often as part of a yield increasing "package" of farm inputs. Many governments subsidized the price. Now, however, consensus is emerging on the need for integrated pest management (IPM), a general effort to reduce losses to pests without harmful effects on human health and the environment.[29]

Water: While supplies of water are adequate in the aggregate to meet demand for the foreseeable future, water is poorly distributed across countries, within countries, and between seasons. By 2025, 50 countries with a total population of 3 billion may face water stress. Demand for water will continue to grow rapidly. Our projections indicate a 35 percent increase in global water withdrawals between 1995 and 2020. In developed countries, most of the increased demand will be industrial. Developing countries are projected to increase withdrawals by 43 percent, with domestic and industrial uses doubling at the expense of agriculture.

Reforming policies that have contributed to the wasteful use of water offers considerable opportunity to save water, improve use efficiency, and boost crop output per unit of water. Reforms include establishing secure water rights for users, decentralizing and privatizing water management functions, and setting incentives for conservation.

Wild and marginal land: Poor people in developing countries tend to depend on agriculture, on annual crops (which generally degrade soils more than perennial crops), and on common property lands (which generally suffer greater degradation than privately managed land). Because they often lack the capacity to make land-improving investments, poor people tend to suffer more than nonpoor people from soil degradation. Degradation and lack of access to high-quality land often push poor people into clearing forests and pastures for cultivation, frequently at the expense of wildlife habitat. The process of land clearing contributes to further soil degradation. Policies to address the

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[28]Montague Yudelman, Annu Ratta, and David Nygaard, *Issues in Pest Management and Food Production: Looking to the Future* B *Food, Agriculture, and the Environment Discussion Paper* No. 26 (Washington: IFPRI, 1998); *1998-99 World Resources Guide to the Global Environment: Environmental Change and Human Health* (New York: Oxford University Press, 1998); Per Pinstrup-Andersen and Rajul Pandya-Lorch, "Food for All in 2020: Can the World Be Fed without Damaging the Environment?," *Environmental Conservation* 23:3 (1996): 226-234.

[29]The CGIAR defines IPM as "ecologically-based pest management that promotes the health of crops and animals, and makes full use of natural and cultural control processes and methods, including host resistance and biological control. It uses chemical pesticides only where and when the above measures fail to keep pests below damaging levels. All interventions are need-based and are applied in ways that minimize undesirable side-effects." This definition, one of many, is posted at <www.cgiar.org/spimp/cgpolicy.htm>, accessed 5/7/98.

problems should raise the value of forests and pastures and offer incentives for their sound management. Creation of nonfarm employment opportunities is also important.[30]

AGRICULTURAL DEVELOPMENT IS CRITICAL TO FOOD SECURITY

Despite rapid urbanization in the developing world, poor people remain overwhelming rural. According to the World Bank, around 70 percent of poor and food insecure people reside in rural areas and depend directly or indirectly on agriculture for their livelihoods (Figure 12). Even in Latin America, where the populace is substantially urban, most poor people live in the countryside. The Bank forecasts that poverty's center of gravity will remain rural in the early decades of the 21st century.[31]

Low productivity in agriculture is a major cause of poverty, food insecurity, and poor nutrition in low-income developing countries, resulting in low incomes for farmers and farm workers, little demand for goods and services produced by poor nonagricultural rural households, and urban unemployment and underemployment.[32] Hence, agriculture must figure prominently in any poverty alleviation strategy. Moreover, agriculture's linkages to the nonfarm economy generate employment, income, and growth in the rest of the economy. Agricultural growth and development also help meet growing food needs. And a healthy agricultural economy offers incentives for natural resource conservation (Figure 13).

Accelerated public investments are needed to facilitate agricultural and rural growth through:

- Yield increasing crop varieties, including drought- and salt-tolerant and pest resistant varieties, and improved livestock;
- Yield-increasing and environmentally-friendly production technology;
- Reliable, timely, and reasonably priced access to appropriate inputs such as tools, fertilizer, and, when needed, pesticides, as well as the credit often needed to purchase them;

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[30] Sara J. Scherr, "Soil Degradation: A Threat to Developing-Country Food Security by 2020?," *2020 Brief* No. 58 (Washington: IFPRI, February 1999).

[31] Alex F. McCalla and Wendy S. Ayres, *Rural Development: From Vision to Action* (Washington: The World Bank, 1997).

[32] Christopher L. Delgado, Jane Hopkins, Valerie Kelly with Peter Hazell, Anna A. McKenna, Peter Gruhn, Behjat Hojjati, Jayashree Sil, and Claude Courbois, "Agricultural Growth Linkages in Sub-Saharan Africa," *Research Report* No. 107 (Washington, D.C.: International Food Policy Research Institute, 1998).

- Strong extension services and technical assistance to communicate timely information and developments in technology and sustainable resource management to farmers and to relay farmer concerns to researchers;
- Improved rural infrastructure and effective markets;
- Particular attention to the needs of women farmers, who grow much of the locally produced food in many developing countries; and
- Primary education, health care, clean water, safe sanitation, and good nutrition for all (Figure 14).

These investments need to be supported by good governance and an enabling policy environment, including trade, macroeconomic, and sectoral policies that do not discriminate against agriculture, and policies that provide appropriate incentives for the sustainable management of natural resources, such as secure property rights for small farmers. Development efforts must engage small farmers and other low-income people as active participants, not passive recipients; unless the affected people have a sense of ownership, development schemes have little likelihood of success.

Achieving this will require a reversal in current trends. Public investment in agriculture is on the decline in developing countries, which on average devote 7.5 percent of government spending to agriculture (and just 7 percent in Sub-Saharan Africa). In addition to the sharp decline in aid to agriculture, donors' rather inflexible emphasis of the past 20 years on less government and a smaller public sector has contributed to public disinvestment in agriculture.[33]

Agricultural research is essential. Public investment in agricultural research is crucial for achieving future food security. The private sector is unlikely to undertake much of the research needed by small farmers in developing countries because it cannot expect sufficient economic gains to cover costs. Even minor increases in aid to agricultural research for developing countries can significantly boost food supplies, while relatively small cuts can have very serious negative effects. Globally, average annual returns to agricultural research and development investment are 45-79 percent.[34] Yet, low-income developing countries invest less than 0.5 percent of the value of farm production to agricultural research, compared to 2 percent in higher-income countries.[35]

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[33] FAO, *Investment in Agriculture: Evolution and Prospects*, *World Food Summit Technical Background Document* Number 10 (Rome: FAO, 1996).

[34] Julian M. Alston, Michele C. Marra, Philip G. Pardey, and T.J. Wyatt, "Research Returns Redux: A Meta-Analysis of the Returns to Agricultural R&D," *Environment and Production Technology Division Discussion Paper* No. 38 (Washington: IFPRI, 1998); Mark W. Rosegrant, M. Agcaoili-Sombilla, and N.D. Perez, "Global Food Projections to 2020: Implications for Investment," *Food, Agriculture, and Environment Discussion Paper* No. 5 (Washington: IFPRI, 1995).

[35] Philip G. Pardey and Julian M. Alston, "Revamping Agricultural R & D," *2020 Brief* No. 24 (Washington: IFPRI, 1996).

Sub-Saharan Africa, which desperately needs productivity increases in agriculture, has only 42 agricultural researchers per million economically active persons in agriculture, compared with 2,458 in developed countries. Annual growth of African agricultural research expenditures declined in the 1970s and 1980s.

Continued low productivity in agriculture not only contributes to food gaps in poor countries, but also prevents attainment of the broad-based income growth and lower unit costs in food production needed to help fill the gap and improve food security. While efforts to improve longer-term productivity on small-scale farms, with an emphasis on staple food crops, must be accelerated, research and policies are also needed to help farmers, communities, and governments better cope with risks resulting from poor market integration, poorly functioning markets, climatic fluctuations, and other factors. More research must be directed to the development of appropriate technology for sustainable intensification of agriculture in resource-poor areas, where a high percentage of poor people live, and where environmental risks are severe. All appropriate scientific tools, as well as better utilization of the insights of traditional indigenous knowledge, should be mobilized to help small farmers in developing countries.

Both the aid community and the governments of many low-income countries have failed to place sufficient emphasis on such agricultural research during the last 10-15 years. However, there are now signs that policy-makers are recognizing the need to expand investment in agricultural development, particularly agricultural research. But research and technology alone will not drive agricultural growth. The full and beneficial effects of agricultural research and technological change will materialize only if government policies are conducive to and supportive of poverty alleviation and sustainable management of natural resources.

THE ROLE OF FOOD AID

Food aid can play a role in food security as part of a comprehensive sustainable development strategy. Food aid is essential to relieve many (though not all) humanitarian emergencies stemming from natural disasters, armed conflict, or a combination of the two. For low-income, food deficit countries (LIFDCs) facing foreign exchange constraints or severe indebtedness, food aid can also help alleviate food gaps. It can help bolster food security among vulnerable groups as well, if it is targeted in ways that do not displace domestic production.

However, food aid in kind remains highly dependent on the availability of cereal surpluses in North America and European Union member states. Because many key donors budget for food aid in monetary, rather than tonnage terms, volumes tend to rise and fall inversely to the movement in cereal (especially wheat) prices.

Thus, food aid volumes plunged 58 percent from a post-Second World War high of 17 million tons in 1993 to 7.3 million tons just four years later (Figure 15). The fall

resulted from smaller surpluses, reduced government stock-holding in donor countries, and escalating prices. During the 1996-97 period, food aid plunged to an historic low, even though tens of millions of people faced emergency conditions in Africa and elsewhere. Supply conditions in donor countries likewise drove the food aid volume rebound to 8 million tons in 1998. The figure is estimated to have reached 12-15 million tons in 1999, due to the combination of increased emergency needs, weak commercial demand in Asia, relatively low international prices, and substantial stocks overhanging domestic markets in exporting countries. Tonnage is projected to fall slightly this year. But the expanded supply is likely to prove short-lived, as it is probable that donors will adjust domestic farm policies to reduce surpluses as a means of bolstering prices. Future WTO requirements may also result in smaller surpluses. Meanwhile, commercial demand is recovering in Asia.[36]

Project food aid offers the most room for creativity, linking food resources directly or indirectly, via monetization, to major development concerns such as sustainable agriculture, female education, child survival, and income generation activities. However, food aid donors have in recent years tended to give lower priority to project food aid and meeting LIFDC food gaps, concentrating resources on emergency response and meeting diplomatic objectives via program food aid.

Emergency food assistance averaged more than 36 percent of all food aid over 1994-98, compared to 25 percent in 1993. It has exceeded the share going to project food aid every year since 1992. Long-term trends are extremely difficult to predict, but as of February 2000, 33 countries faced food emergencies, mainly as a result of adverse weather, violent conflict, and chronic economic difficulties, leaving more than 15 million people in need of humanitarian assistance.[37] Humanitarian food aid is likely to continue receiving first call on food aid resources, and rightly so. Prevention and resolution of conflicts and the building of local disaster response capacity in developing countries are important to reducing need in the long-term.

Even as food aid volumes increased in 1999, the share of food aid going to LIFDCs fell to 60 percent, compared to over 90 percent in the mid-1990s. As tonnage increased, donors devoted substantial portions of the larger volumes to program food aid for the newly independent states of the former Soviet Union on political grounds.

The U.S. Department of Agriculture estimates that by 2009, low-income countries will need some 33 million tons of food aid beyond domestic production and commercial imports if all their residents are to be able to meet minimum nutritional requirements.[38]

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[36] FAO, *Food Outlook* No. 1, February 2000; Professor Patrick Webb, Tufts University, personal communication.

[37] FAO, *Food Outlook* No. 1, February 2000.

[38] U.S. Department of Agriculture, *Food Security Assessment*, GFA-11, December 1999.

Despite the Marrakesh Decision, over the last half of the 1990s, food aid has provided LIFDCs about 8 percent of their import needs, compared to 22 percent in the mid-1980s.[39] Projected continued decline in food prices may bolster food aid tonnages over the next decade, but there is simply no likelihood of food aid approaching anything resembling the forecast level of need.

In order to assure a stable flow of food aid for purposes that support food security, a greater proportion of assistance should be in the form of triangular food aid, locally purchased food, and financing for untied food purchases. However, the United States, the largest donor, currently ties virtually all of its food aid to domestic surpluses.[40]

CONCLUSION

IFPRI projections indicate that food insecurity and child malnutrition will remain widespread in 2020. FAO is not optimistic about meeting the World Food Summit goal. However, it is possible to meet and even exceed that target. If we can mobilize new technological developments, including those in biotechnology, for the benefit of poor and food-insecure people in developing countries; if we can renew our investments in the factors essential for agricultural growth, including agricultural research and human resource development; if we can harness the political will to adopt sound policies for eradicating poverty, fostering food security, and protecting natural resources; if food aid donors give greater priority to meeting the needs of poor countries and their vulnerable populations, and reduce the tying of assistance to their domestic surpluses; and if we can alter our behaviors and priorities to assure equitable, sustainable, and participatory development, achieving a food-secure world will not be a mere pipe dream.

Table 1: Number of Undernourished People in Developing Regions (millions)

Region	1969-71	1979-81	1990-92	1995-97
Sub-Saharan Africa	89	126	164	180
Middle East	45	22	26	33
East and Southeast Asia	504	406	283	241
South Asia	267	338	299	284
Latin America	54	46	59	53
Developing World	960	938	831	791

Source: FAO.

[39] FAO, *Food Outlook* No. 1, February 2000.

[40] "Reforming Food Aid: Time to Grasp the Nettle?," *ODI Briefing Paper* 1, January 2000.

Table 2: Proportion of Population Undernourished in Developing Regions (percent)

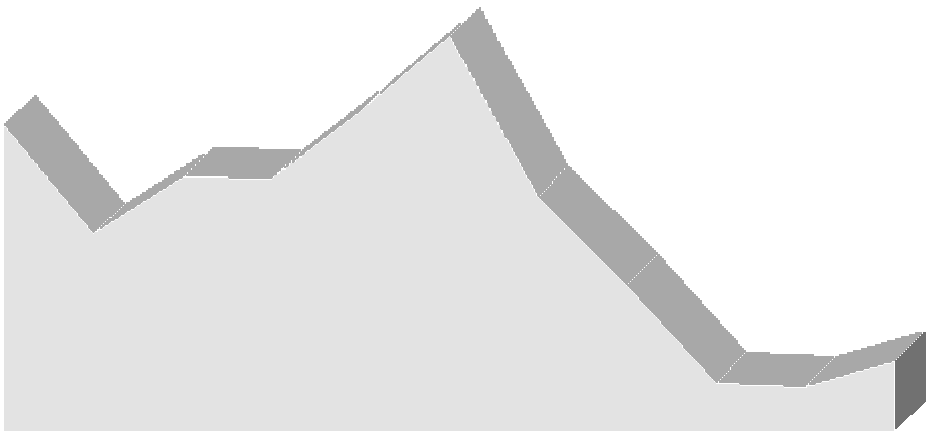
Region	1969-71	1979-81	1990-92	1995-97
Sub-Saharan Africa	34	37	35	33
Middle East	25	9	8	9
East and Southeast Asia	43	29	17	13
South Asia	38	38	26	23
Latin America	19	13	13	11
Developing World	37	29	20	18

Source: FAO

Figure 1: Global Food Aid Deliveries

(in million tons)

1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
14.8	11.7	13.3	13.2	15.2	17.3	12.8	10.2	7.4	7.3	8



Source: U.N. World Food Programme.