

CIAT's perspective to 2020: Emerging Challenges and new opportunities for addressing the CGIAR goals of alleviating poverty, hunger and malnutrition through agriculture, forestry and fisheries (AFF) related activities

Global Problems and Opportunities

Challenges of Globalization

Persistent poverty and accelerating environmental degradation are two of today's most pressing global problems. The portion of the world's population that is poor has declined because of economic growth fueled largely by rapid scientific and technical advances. Even so, about 1.2 billion people today remain absolutely poor, with incomes of less than US\$1.00 a day. Among the worst consequences of this poverty is hunger, which affects more than 800 million people—mostly women and children—who must endure the resulting problems of malnutrition and weakened health. While these poor are being largely bypassed by technical and economic progress, this same economic growth and technical change is associated with growing signs of environmental damage that put all human health and welfare directly at risk.

Environmental degradation and absolute poverty are global problems with effects that reach far beyond the poor people themselves. Poverty, besides being ethically disturbing in an ever-richer world, exacerbates for everyone problems of health, peace, and security. Likewise, we are all threatened by environmental problems such as the mass destruction of natural ecosystems, loss of biodiversity, chemical pollution, degradation of soil and water resources, and accumulation of greenhouse gases.

Environmental degradation and persistent poverty are occurring in the context of massive global change. With advances in communications, transportation, and information technologies, people all over the world are both far more aware of their interconnectedness and far more integrated politically, socially, and economically. These changes are accompanied by the rise of new institutions with global reach, including, for example, global conventions on the environment, international nongovernmental organizations, multinational corporations, and international scientific efforts like the Future Harvest Centers for agricultural research. These social and technical changes promise greater scientific collaboration, increased coordinated international efforts to deal with global problems, wider and more rapid diffusion of new technologies, and new market opportunities. Nevertheless, globalization puts disadvantaged groups at risk of further marginalization, with the low-income tropical countries being particularly vulnerable. The poor lack power, be it of information, the marketplace, politics, or even to change their own circumstances. Thus, even though globalization of science, information, markets, and collective action may promise a better world, without compensatory mechanisms, the poor in low income tropical countries are at risk of being excluded from these opportunities.

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Poverty

During the coming decades, the largest numbers of poor people will be concentrated in low-income tropical countries, principally in Asia and Africa, but also in South and Central America where poverty is chronic. Globally, most poor people, especially the poorest of the poor, live in rural areas or are fleeing to seek better lives in the cities, where many live in urban squalor. Improving rural livelihoods is therefore the most direct way of addressing the needs of most of the world's poor.

Agriculture, including related post-harvest activities, is by far the single most important source of income and employment for the rural poor. In addition, food is usually the largest expense of poor people. Thus, for most of the world's rural poor, agriculture and affordable food are key to improved livelihoods, even though other elements can sometimes be significant.

Moreover, overcoming food insecurity and hunger, which affect both the rural and urban poor, depends critically on agriculture. Food security cannot possibly be assured unless enough food is produced. However, hunger and poverty cannot be eliminated simply through additional food production alone. Even though global supplies may be adequate, international trade cannot be counted upon to distribute food through market mechanisms to poor people who lack purchasing power, especially in remote rural areas with high transport costs. Many of the rural poor need higher incomes to access food, and agriculture remains a crucial source of income for them.

Food production is also of great concern in that it must keep pace with continuing population growth. Producing enough food for future generations can be achieved only by increasing agricultural productivity. However, recent evidence suggests that the pace of increase in agricultural productivity may have begun to slow, raising the possibility of a gap emerging between future food availability and people's needs.

Environment and natural resources

Even the sustainability of current agriculture is being questioned. Some scientists see today's agriculture as intrinsically damaging to the environment: it is notable for destroying biological diversity; for widespread and often excessive use of herbicides, pesticides, and fertilizers that severely damage the environment; for depleting water and soil resources; and for being a significant source of two major greenhouse gases—methane and nitrous oxide.

Environmental degradation induced by agricultural activities is a major problem in poor tropical countries. The highest rates of destruction of natural habitats occur as land is cleared for agriculture, particularly in Latin America and Africa, which have the greatest expansion of agricultural area. Land degradation is also a major problem, especially in Latin America, which has twice the area of severely or moderately degraded lands as has Africa and four times as Asia. Water is an increasingly scarce resource, facing competing demands from agriculture and urban uses. Poor farmers are not, in fact, the major cause of environmental degradation in the tropics, but their livelihoods are threatened by the degrading resource base.

Climate change

A degrading environment has global consequences. For example, growing evidence confirms that temperatures are rising, which may lead to future reductions in potential crop yields in most tropical and subtropical regions. Currently, climatic change is expected to slow growth in world food production, thereby leading to higher food prices that the poor may have difficulty in paying. In particular, food security is expected to worsen in Africa. The ability of people to adapt to and cope with climatic change depends on such factors as wealth, technology, education, information, skills, infrastructure, and management capabilities. Developing countries, particularly the least developed countries, generally have less capacity to adapt and are thus more vulnerable to damage from climatic change. The poorest of the poor may often have the most to lose from climate change.

Human health

Human health is directly related to agriculture. Obviously, human health is critically dependent on both nutritional quality, especially in terms of mineral and vitamin micronutrients, and quantity of food. Unsound agricultural practices can also negatively affect human health, for example, through excessive pesticide use, leading to the presence of residues in food. Agricultural practices can also indirectly affect human health by changing agroecosystems, which then change the behavior of disease vectors. Evidence from the Amazon, for example, indicates that clearing natural forest for agriculture has led to increased soil runoff that in turn has raised the level of mercury in fish thereby leading to harmful levels in human diets. Again, it is usually the poorest of the poor who are most vulnerable to health risks associated with inadequate diets or inappropriate agricultural practices.

Advances in Science and Technology

Science can contribute significantly to resolving the interrelated problems of poverty, food insecurity, and environmental degradation, although, by no means, can any of these complex issues be fully resolved by a simple technical solution or other single measure.

Science and technical innovation can provide crucial elements to developing a new agriculture that is environmentally sound while also increasing agricultural productivity and reducing hunger among the poor people of the tropics.

Despite the difficulties of generating a new, more sustainable and productive agriculture for the tropics, much of which is characterized by fragile environments, several new scientific opportunities promise that such agriculture can be developed. Advances in genetics, agroecology, and informatics can all contribute to the fulfillment of this promise.