

# Bridges to Prosperity



Food Security, the Environment,  
and Peace for Central America



# Bridges to Prosperity: Food Security, the Environment, and Peace in Central America



We are building bridges to prosperity for the small-scale, subsistence farmers who produce basic food crops in Central America.<sup>1</sup> Our vision is to reduce poverty and environmental degradation and promote peace. We are a group of enlightened officials of governments in the region, Nobel Peace Laureate Norman E. Borlaug and other international figures, the Swiss Agency for Development and Cooperation, and CIMMYT, CIAT, and CIP.<sup>2</sup> Join us, and make this vision a reality.

<sup>1</sup> "Central America" refers to Central America and the Caribbean for maize and includes Mexico for beans and potatoes.

<sup>2</sup> The International Maize and Wheat Improvement Center (CIMMYT), the International Center for Tropical Agriculture (CIAT), and the International Potato Center (CIP). These internationally funded, nonprofit, food and environmental research centers work with agricultural research institutions throughout the developing world.



## Central America: Hard-won Stability Hangs in the Balance

Linking two continents and huge regional markets, Central America presents promising yet fragile development perspectives. Maize, beans, and potatoes—native endowments of the hemisphere—are food, livelihood, and culture. But government support for public research and extension has severely eroded. Nor have the region's millions of small-scale farmers benefited from economic restructuring, global markets, or the activities of private seed companies. Poverty and a lack of alternatives force them to mine the environment. Rural families flock to the cities, adding to urban poverty. Poverty in general fuels social conflicts.



## Invest in Food Security, the Environment—and Peace!

Agriculture is crucial to a stable future in Central America, where subsistence farming predominates. Reaching all farmers with relevant, more productive seed and cropping practices requires a concerted effort among researchers, investors, enlightened officials, domestic seed producers, non-government organizations, and farmers themselves. With your support, we will deliver available improvements quickly and effectively by capitalizing on existing structures, people, and linkages. New versions of current products will be developed, tested, and promoted over the medium term. The capacity of agricultural research systems to serve tomorrow's farmers will be conserved.

*Everything is in place. Smallholder farmers in Central America are ready to cross the bridge. The only thing missing is you.*







## Improved varieties: Workhorses of increased productivity

The free and intense exchange of experimental varieties through the networks has resulted in large economic gains. As of 1996, the region was obtaining annual benefits on the order of US\$70 million through use of improved maize varieties. More than 100 such varieties have been made available to farmers since 1996; CIMMYT maize figures in the lineages of 75%.

Economic benefits from improved bean

varieties were estimated at US\$24 million for 1997-98, with a cumulative value of US\$200 million in the last two decades. The region's countries have released more than 30 new varieties developed through PROFRIJOL and CIAT in the last 10 years, raising average yields by over 200 kilograms per hectare—enough additional output to meet the yearly bean consumption demands of some 3.2 million more people than before. The variety DOR 364, which is resistant to bean golden mosaic virus, saved Central American bean production from near total collapse due to the disease. Potato yields rose 60% during 1978-99; a third or more of this gain can be traced to new varieties emerging from joint efforts of PRECODEPA and CIP. Varieties that possess resistance to a leading potato disease, late blight, cover 60% of the potato area in Costa Rica, Honduras, and El Salvador and about 20% in Mexico and Guatemala. Their use has allowed farmers to cut fungicide applications by as much as half in these zones. Thanks to the efforts of PRECODEPA, countries such as Mexico, Guatemala, and Costa Rica produce their own quality seed of improved potato varieties. Finally, the networks have helped national programs replace collections of improved seed after near-total losses, as recently occurred in the wake of Hurricane Mitch.

## Snapshots of Impact

Much has already been achieved by public research programs in these countries, with support from international centers, funding agencies, and regional crop research and dissemination networks.<sup>1</sup> The networks in particular have helped national crop research programs perform more effectively, fostering the sharing of seed and experience across borders, introducing regional priority setting and resourcing, and providing access to cutting-edge science. Economic analyses show that over 1980-96 every 6 cents invested in the PRM alone provided US\$1 of benefits to maize farmers! The following impact vignettes from the three networks furnish strong evidence: collaborative agricultural research and development can boost productivity, protect the environment, and improve farmers' livelihoods.

<sup>1</sup> The Regional Maize Program (Programa Regional de Maiz, or PRM); The Regional Bean Program (Programa Regional de Frijol, or PROFRIJOL); and the Cooperative Regional Potato Program (Programa Regional Cooperativo de Papa, or PRECODEPA); these networks emerged as of the late 1970s. They receive technical support from CIMMYT, CIAT, and CIP and are funded by the Swiss Agency for Development and Cooperation (SDC).

## Resource-conserving practices that also boost yields

Adoption of conservation tillage has allowed farmers to boost maize yields from 1.5 to 4.0 tons per hectare while halting erosion in an intensive, hillside, maize-sorghum rotation in El Salvador. Network researchers have refined and spread the practice to other parts of the region. In Azuero, Panama, for instance, at least 6 of every 10 farmers now use reduced tillage to save money, reduce weeds and herbicide use, and conserve soils. Use by farmers of easy, natural disease and pest control methods developed through PRECODEPA has led to a 25% reduction in pesticide use on potatoes in those areas. Finally, farmer participatory research approaches, including on-farm research, are now used routinely.

## Human resource and institutional development: Vanishing capital?

The networks have provided crucial opportunities for hundreds of researchers to build skills and careers and connect with peers. Offerings have included courses, workshops, advanced study programs, links to centers of excellence, regional conferences, and incentives and support for publishing or otherwise sharing results with the larger scientific community. More than anything, a huge stock of capital in agricultural research capacity has been amassed—a capital now threatened with extinction.

*Strong collaborative initiatives are needed to meet the needs of small-scale, low-input farmers. No single government or organization working alone can efficiently develop and promote relevant, productivity enhancing, resource conserving crop varieties or farming practices.*

*Much has been accomplished to date, but the job is only half finished (and perhaps the easiest half).*

*This is where you can help. Turn the page to find out more!*



## Poverty vs. Prosperity in Central America: A Gap that Needs Bridging

Despite rising average incomes, striking inequalities in the distribution of income, land, and opportunity condemn millions to poverty in Central America, generation after generation. One of poverty's several ugly faces is food insecurity: many of the region's inhabitants simply don't have enough to eat. Average per capita availability of calories in the region dropped from 2,500 per day in the 1980s to 2,300 in the 1990s. This is still slightly above the minimum daily requirement, but masks significant regional disparities in nutrition: about 15% of the population in Central America is underfed, including some 3 million children. In Guatemala and Haiti, for example, one out of every four children is malnourished. Economic strategies in the region in the latter part of the 20th century have emphasized urban-based industrialization and import substitution and neglected or actively discriminated against agriculture and rural areas. Worsening poverty in the countryside has fueled social unrest and large-scale migration to cities, where new arrivals often add to the growing ranks of the underprivileged.

## Poverty's Heavy Environmental Toll

Poor farmers often mine tomorrow's resources to produce today's food. Shall we allow the continuation of circumstances that force them to do so? Unsuitable cropping practices have degraded soil structure and fertility over large areas in Central America, and erosion has completely removed topsoil from many hillsides. Deforestation has halved woodlands since 1960. Population growth, plantations, and cattle ranchers push small-scale farmers onto ever-more-marginal lands, including fragile hillslopes and tropical forests. Slash and burn systems persist.

## Smallholder Farmers *Do* Matter

The most pressing issue in the future may be helping poor households in remote areas to improve their food security. Smallholders are in fact more important than their share of arable and permanent cropland would suggest. They commonly provide up to a third of basic cereal production, even though their share of cropland rarely exceeds 15%. If provided equivalent access to public goods and appropriate, cost-effective technologies, smallholders could hold their own with large producers and international competition under trade liberalization. In effect, they could move from an economy of subsistence and poverty to one based on surplus and accumulation.

## Agriculture: One Bridge to Prosperity

It has been estimated that, for Latin America in general, every increase of US\$1 in agricultural output increases overall economic output by almost US\$4. Agriculture can provide a firm foundation for broad-based economic growth in regions such as Central America. Stronger, environmentally friendly agricultural growth generates additional employment, income, and economic growth in both rural and urban areas. It contributes to overall rural development, improves the region's ability to meet growing regional and global food needs, and helps conserve natural resources. Given that so many women, indigenous groups, and poor people participate directly in agricultural production, processing, and distribution, a vibrant food and agricultural system will also promote social and economic equity. Aside from agriculture's relative share in the labor force, recall a simple truth: everyone eats food. It is difficult to find another sector of the economy for which the benefits of modernization will be so widely distributed and so biased in favor of the poor.



## The Task Ahead: Moving From Subsistence to Surplus

The networks' impacts are considerable, but numerous impoverished farmers in remote, marginal areas have yet to be reached by research. Depending on the country, at most 45% (and as few as 7%) of the maize farmers sow improved varieties, and only about 40% of the bean farmers. Most still use traditional cropping systems that fail to meet household food demands, let alone produce a surplus or maintain natural resources.

Despite the networks' solid accomplishments and the clear need to reach these forgotten farmers and generally modernize staple crop production, public funding for research on the basic crops has fallen precipitously in Central America. Over the 1990s, publicly funded crop research programs were forced to reduce staff by half, on average. Most seriously affected were the extension corps once charged with actually delivering improved products to farmers. Globalization, the lowering of trade barriers, the redefinition of the state's role, and the privatization of public industries and services have shifted the emphasis away from basic food crops and eroded the agricultural research capacity that took decades to build.

To bridge the agricultural technology gap separating millions of poor farmers in Central America from food security and better livelihoods, the Swiss Agency for Development and Cooperation, forward-looking government officials from the region, Nobel Peace Laureate Norman E. Borlaug and other international figures, and CIMMYT, CIAT, and CIP have a vision.

Turn the page to find out more!







## Bridging the Gap: Distant Visions?

We ask you to imagine a bold new reality for smallholder farmers in Central America: A life where they and their families can feed themselves from the farm. Where modest surpluses from harvests can be sold to help meet other basic needs, improve operations, or invest in small agro-businesses. Where careful crop management practices conserve soil quality and avoid erosion, without sacrificing yields. Where improved productivity helps avoid the need to open tropical forests or other fragile lands to cropping. Where improved nutrition and well-being help reduce social conflict. Where children can eventually choose to stay and work the land, or seek educations and livelihoods off-farm—but on their own terms, rather than in a desperate flight from misery.

This reality is not so distant. You only have to help *us* help farmers to cross the bridge to a better life. What do they need?

- More productive, resource efficient maize, bean, and potato varieties.
- Farming practices that increase yields and conserve resources. These include reduced tillage, residue management, grain legume intercrops, and integrated approaches for controlling pests and diseases.
- Local production and sale of seed of improved varieties.
- Improved storage practices for both grain and seed.
- Improved access to local markets.

There is good news: Improved varieties and grain and seed storage technologies for small farmers are already in hand, having been developed by the networks in concert with national research programs and the international centers. The issue is one of delivery. This implies taking current products and testing, fine-tuning, and promoting them with farmers in a range of environments. Improved cropping practices also exist, but are more site-dependent. Tapping them for farmers in specific locations will require intensive, medium- or long-term adaptive research. Local seed production implies selection and training of farmer seed producers, as well as start-up support for their operations. It will also mean work with domestic seed companies and non-government organizations interested in producing seed themselves or helping farmers to do so. Finally, improved seed and practices for coming decades depend on today's research: Continued support for the current technical capacity is required.





## Building Bridges to Link Expertise

To get relevant technology to farmers who need it, we propose a dedicated consortium of researchers, investors, enlightened officials, domestic seed producers, non-government organizations, and (especially) farmers themselves. Work will follow a farming systems approach, apply farmer participatory strategies that ensure relevant outcomes, and use cutting edge information science, such as models and geographic information systems, where applicable.

The networks, international centers, and SDC are forging the needed plans and linkages now. Details such as institutional arrangements and work agendas will be finalized in a professionally moderated, regional planning workshop in early 2001. A key component in all of this is reliable financing.



## Ways You Can Invest in Food Security, the Environment, and Peace for Central America

To ensure funding until the job gets done, we offer several ways to invest. All are designed to provide financial autonomy and to respect ownership by all stakeholders in this enterprise, including farmers and investors.

- The first (and most significant in terms of value added) is a regional agricultural research and development foundation known as FRIDA (Fundación Regional para la Investigación y Desarrollo Agrícola). FRIDA integrates the crop networks and new partners from the public and private sector, non-government organizations, and universities, as well as farmers. The foundation is sponsored by SDC, CIMMYT, CIAT, and CIP. SDC has pledged to support the crop networks until 2003 and promised a significant additional contribution to FRIDA if the foundation attracts at least US\$1.5 million by early 2001.
- A specially earmarked account held in the World Bank or another regional foundation.
- A revolving fund, whereby the consortium spends up front and submits expense accounts for coverage.
- Contributions to the Consultative Group on International Agricultural Research (CGIAR) for the consortium.
- Direct contributions to CIMMYT, CIAT, CIP restricted for use in consortium activities.

## Central America: General Statistics

|                    | Population<br>(millions) | Area planted<br>to basic grains<br>(ha/000 person) | Poverty*<br>(%) | Calories/<br>person/day |
|--------------------|--------------------------|--|-----------------|-------------------------|
| Costa Rica         | 4.0                      | 34.9   | 19 **           | 2,781                   |
| Cuba               | 11.2                     | 28.2   | —               | 2,473                   |
| Dominican Republic | 8.5                      | 21.1   | 20 **           | 2,277                   |
| El Salvador        | 6.3                      | 89.6   | 56              | 2,522                   |
| Guatemala          | 11.4                     | 74.0   | 53 **           | 2,159                   |
| Haiti              | 8.2                      | 72.5   | 65 #            | 1,876                   |
| Honduras           | 6.5                      | 102.4  | 47 **           | 2,343                   |
| Nicaragua          | 5.1                      | 100.1  | 76              | 2,208                   |
| Panama             | 2.9                      | 65.5   | 26 **           | 2,476                   |
| Mexico             | 98.9                     | 117.4  | 15 **           | 3,144                   |

\* Percent of the rural population below the poverty line, according to national standards in individual countries and surveyed during different years during the early 1990s.

\*\* Percent of the entire population living on US\$1 per day or less, international standards.

# Percent of the entire population below the poverty line, by national standards.

## Production of Three Major Food Crops in Central America

|          | Area<br>(million ha) | Production<br>(million t) | Average yield<br>(t/ha) |
|----------|----------------------|---------------------------|-------------------------|
| Maize    | 2.0                  | 3.2                       | 1.5                     |
| Beans    | 2.7                  | 1.6                       | 0.6                     |
| Potatoes | 0.1                  | 2.1                       | 19.9                    |

Figures for beans and potatoes include Mexico.

For more information about the circumstances of farmers in Central America, the initiative described in this document, or how you can make a contribution to this important work, please contact us directly:

*Ambassador Walter Fust*  
Director

Swiss Agency for Development  
and Cooperation (SDC)  
Tel: +41 31 322 34 32  
Fax: +41 31 324 16 93  
Email: walter.fust@deza.admin.ch  
Internet: www.deza.admin.ch

*Prof. Timothy G. Reeves*  
Director General

International Maize and Wheat  
Improvement Center (CIMMYT)  
Tel: +52 5804 2004  
Fax: +52 5804 7558  
Email: t.reeves@cgiar.org  
Internet: www.cimmyt.org

*Dr. Joachim Voss*  
Director General

International Center for  
Tropical Agriculture (CIAT)  
Tel: +57 2 445 0000  
Fax: +57 2 445 0073  
Email: j.voss@cgiar.org  
Internet: www.ciat.cgiar.org

*Dr. Hubert Zandstra*  
Director General

International Potato Center  
(CIP)  
Tel: +51 1 349 6017  
Fax: +51 1 349 5638  
Email: h.zandstra@cgiar.org  
Internet: www.cipotato.org



**CIMMYT**<sup>®</sup>, **CIAT**, and **CIP** are internationally funded, nonprofit, non-government food and environmental research organizations dedicated to alleviating hunger and poverty and preserving natural resources in developing countries. All three are Future Harvest ([www.futureharvest.org](http://www.futureharvest.org)) centers and receive their principal funding from 58 governments, private foundations, and international and regional organizations known as the Consultative Group on International Agricultural Research. Future Harvest builds awareness and support for food and environmental research for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest supports research, promotes partnerships, and sponsors projects that bring the results of research to rural communities, farmers, and families in Africa, Latin America, and Asia.

The **Swiss Agency for Development and Cooperation (SDC)** is responsible for the following areas of activity of the Federal Department of Foreign Affairs (FDA): 1) bilateral development cooperation; 2) multilateral development cooperation; 3) humanitarian aid; and 4) technical cooperation with Eastern Europe. The SDC provides services through direct operations, by supporting the programmes of multilateral organisations and by co-financing and making financial contributions to the programmes of Swiss and international private assistance bodies. The aim of development cooperation is to combat poverty by providing help towards self-help. In particular, it promotes economic and government autonomy, contributes to the improvement of production conditions, helps to solve environmental problems and strives for better access to education and basic health care for the most disadvantaged population groups. The mandate of the Swiss Confederation's humanitarian aid is to save lives and alleviate suffering. It provides direct aid in the wake of natural disasters and in cases of armed conflict through interventions by the Swiss Disaster Relief Corps (SDR). It also supports humanitarian partner organisations. The SDC supports the countries of eastern Europe and the Commonwealth of Independent States (CIS) on their road to democracy and the market economy by knowledge transfer and contributions to problem solving.

The achievements of the Central American crop networks reflect decades of collaborative work funded by SDC, plus technical and other support from three leading international centers (themselves financed by many international funding agencies and linked to advanced research centers worldwide), the national agricultural research systems of Central America and the Caribbean, and farmers. Their efforts built as well on the groundwork laid by agricultural assistance programs of the **Rockefeller Foundation** in Latin America beginning in the 1940s and which resulted in 1954 in the Central American Cooperative Program for Maize Improvement.

Printed in Mexico by CIMMYT on behalf of CIMMYT, CIAT, and CIP. October, 2000.



