

Building an Eco-Efficient Future

CIAT Strategy 2014–2020
A Synthesis





Building an Eco-Efficient Future

Small-scale entrepreneurs in Northern Vietnam have recently learned to produce a better livestock feed by mixing residues from cassava starch processing (which previously polluted nearby rivers) with other locally grown feed resources. They're helping build an eco-efficient future.

So are the Rwandan farmers who've adopted new high-yielding and disease-resistant varieties of climbing bean. As is Peru's Ministry of the Environment, which has designed a novel approach for equitable sharing of the benefits and costs of ecosystem services in the Cañete River Basin.

From vision to reality

For all of these people and many more, eco-efficiency is not some abstract ideal. It's about tangible outcomes from agricultural research, which entail smarter use of resources and translate into valuable impacts, like higher incomes, improved child nutrition, and better water supplies.

In pursuit of such impacts, the International Center for Tropical Agriculture (CIAT) has developed a new strategy for the period 2014–2020. Reaffirming eco-efficiency as a guiding principle of our research, the strategy explains how the Center's growing research team and networks will capitalize on past and current work to help build an eco-efficient future.

The **International Center for Tropical Agriculture (CIAT)** – a member of the CGIAR Consortium – develops technologies, innovative methods, and new knowledge that better enable farmers, especially smallholders, to make agriculture eco-efficient – that is, competitive and profitable as well as sustainable and resilient. Headquartered near Cali, Colombia, CIAT conducts research for development in tropical regions of Latin America, Africa, and Asia.

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In CIAT's new strategy, we commit ourselves to reaching the following targets:



Each country and rural community must build its own eco-efficient future. To that end, *CIAT Strategy 2014–2020* offers not a detailed blueprint but a call to action on many fronts across the diverse panorama of tropical agriculture.

Forces shaping the tropical world

The new technologies, methods, and knowledge that we aim to deliver by or before 2020 will help farmers respond to growing pressures from powerful forces impacting on economies and agro-ecologies across the developing world.

Foremost among these forces is population growth. Overall, it will slow markedly toward 2050, but populations in many developing countries will expand significantly, especially in cities, making food insecurity an increasingly urban phenomenon.

The emergence of more complex agro-industrial value chains to meet urban demand will create new opportunities for economic growth but could displace small-scale producers and processors. Such growth might also take a heavy toll on farmland, water, and other natural resources, as the competition between food and non-food uses of these resources continues to intensify.

Climate change will further magnify agriculture's environmental challenge by steadily diminishing the suitability of many tropical areas for the production of key staple crops.





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Major trends shaping tropical agriculture will unfold differently in each region where CIAT works, requiring carefully crafted responses.

In **Sub-Saharan Africa**, agriculture will face a combination of high population growth, rapidly degrading farmland, and emerging climate change impacts. CIAT's strategic research on crops (common bean, cassava, tropical forages, and rice), soils, and policy analysis will feed into major initiatives aimed at bolstering food and nutrition security, restoring landscapes to ecological health, and fostering economic growth, based on a sustainable and climate-smart agriculture.

For **Asia**, a key challenge will be to ensure that marginalized upland communities gain a greater share of the wealth created by rapid economic development. To this end, CIAT will work to put the cassava and livestock sectors on a more socially equitable and environmentally sound basis, while also helping curb land degradation, create more beneficial market links for farmers, and cope with the impacts of climate change.

Latin America and the Caribbean is a global grain basket and provider of environmental goods, with enormous potential for expanding food exports and putting the management of its natural resources on a sustainable footing. In addition to helping realize these possibilities, CIAT's research will focus on making major agricultural value chains more competitive in response to challenges and opportunities created by trade liberalization and climate change.

Upward spirals of sustainable growth

While farmers have always faced pressure to make better use of their land, labor, crops, and other resources, the forces arrayed against them today make eco-efficiency a more urgent global imperative than at any time in agricultural history. Fortunately, CIAT is better prepared than ever to help farming communities build the eco-efficient future that they and all of us want.

Since its inception in 1967, the Center has created a solid set of strengths in research and partnership. These encompass essentially every aspect of tropical agriculture – including the crop varieties that farmers grow, the production systems they manage, the agricultural landscapes they inhabit, the markets in which they participate, and the policies that influence their options and decisions.

Moreover, in recent years, we have carefully engineered CIAT's research areas so as to project our strengths and achieve greater impact through CGIAR's global research programs.

CIAT's new strategy defines three objectives, which are central for creating upward spirals of sustainable growth:

1. Make affordable, high-quality food readily available to the rural and urban poor by boosting agricultural productivity and enhancing the nutritional quality of staple crops.
2. Promote rural income growth by making smallholder agriculture more competitive and market oriented through improvements in agricultural value chains.
3. Provide the means to make a more intensive and competitive agriculture both environmentally sustainable and climate smart.





Pillars of strength

The research that CIAT will conduct to achieve its objectives aims to put in place eight interlocking pillars of eco-efficient agriculture, which reinforce the wider CGIAR research agenda.

High-yielding, resilient crops

Improved seeds are a major leverage point for strengthening food security and making agriculture environmentally sustainable (see box on page 8). For that reason, the Center will continue to focus a large part of its research effort on the development of new germplasm that is high yielding and resilient in the face of multiple stresses, taking full advantage of recent advances in gene discovery and genomics.

Crop genetic resources

Crop landraces and wild relatives offer valuable genes for the development of new varieties that are resilient under stress and use resources efficiently. CIAT proposes to create a state-of-the-art genebank that will distribute both physical seeds from the collections we safeguard as well as the related digital genetic information that is vital for unlocking their hidden potential.

More nutritious food

Increasing the micronutrient content of crops by means of a breeding approach called biofortification has shown great promise for helping overcome malnutrition. CIAT will continue to develop and promote biofortified bean and cassava varieties, while also promoting food diversification through interventions based on a food basket approach.

Sustainable intensification of agriculture

Improved soil health is critical for optimal expression of crop genetic potential over the long term. To this end, CIAT research will better enable farmers to manage soil biology appropriately, make better choices about soil cover and crops, maintain balanced nutrient supplies, and maximize organic amendments, based on the use of new diagnostic techniques.

Restoration of degraded land

In recent years, major development agencies have taken up the call to rebuild agriculture's natural resource base. CIAT scientists will contribute by generating more and better soil information with national partners, by mapping soil functional properties (such as soil organic carbon), and by evaluating ecosystem health on a landscape scale.

Enhanced ecosystem services

Rural landscapes perform a wide array of vital services, which include the provision of water and food supplies, maintenance of soil fertility, biodiversity conservation, and climate change mitigation. CIAT researchers will work closely with policymakers to create new institutional mechanisms, such as benefit sharing, that better protect these services.

Beneficial links between farmers and markets

Against a background of rapid modernization and globalization, smallholder agriculture has enormous potential to act as an engine of inclusive economic growth. CIAT will develop methods and tools, and conduct research on enabling policies that help build sustained and beneficial commercial relations between farmers organizations and buyers in diverse markets.

Climate-smart solutions

In response to the formidable challenge of climate change, CIAT has undertaken a major effort to develop and implement novel methods for generating information that can guide policies and decisions. This work includes the assessment of likely climate change impacts and of specific technological options and policy instruments, with the aim of informing national adaptation and mitigation plans.





Next steps in crop improvement

In the years ahead, CIAT will continue to concentrate on four crops that are vital across the tropics and subtropics, pushing beyond past gains to reach new heights of production performance.

Common bean

The last 15 years have seen widespread adoption of new varieties of the world's most important food legume. CIAT will build on this achievement by improving smallholder farmers' access to markets, stabilizing yields through greater stress tolerance, and further enhancing nutritional quality.

Cassava

This is the third most important food crop in the tropics and also serves importantly as a livestock feed and industrial raw material. Building on spectacular success in Southeast Asia, CIAT will contribute to a potentially global cassava boom through further improvement in yield and product quality, better agronomy, and concerted efforts to combat emerging pests and diseases.

Tropical forages

Across the tropics, high-quality forages have proved to be a crucial entry point for enhancing rural livelihoods through more intensive livestock production. CIAT will multiply these benefits by developing and promoting improved feeding practices across a wide range of agro-ecologies and farming systems.

Rice

Having developed germplasm that is uniquely suited to the diverse rice-growing environments of Latin America and the Caribbean, CIAT will exploit the potential of these new materials for the region and beyond to deliver significantly higher yields and greater resilience under stress.



Bridges to eco-efficiency

CIAT's new strategy calls for a set of forward-looking strategic initiatives that will boost the development impact of our work and open new avenues for future CGIAR research.

Tropical forages add up to LivestockPlus

Boosting livestock productivity is critical for overcoming malnutrition and poverty in developing countries. But how can we achieve this growth without also accelerating land degradation and raising the livestock sector's already large greenhouse gas emissions?

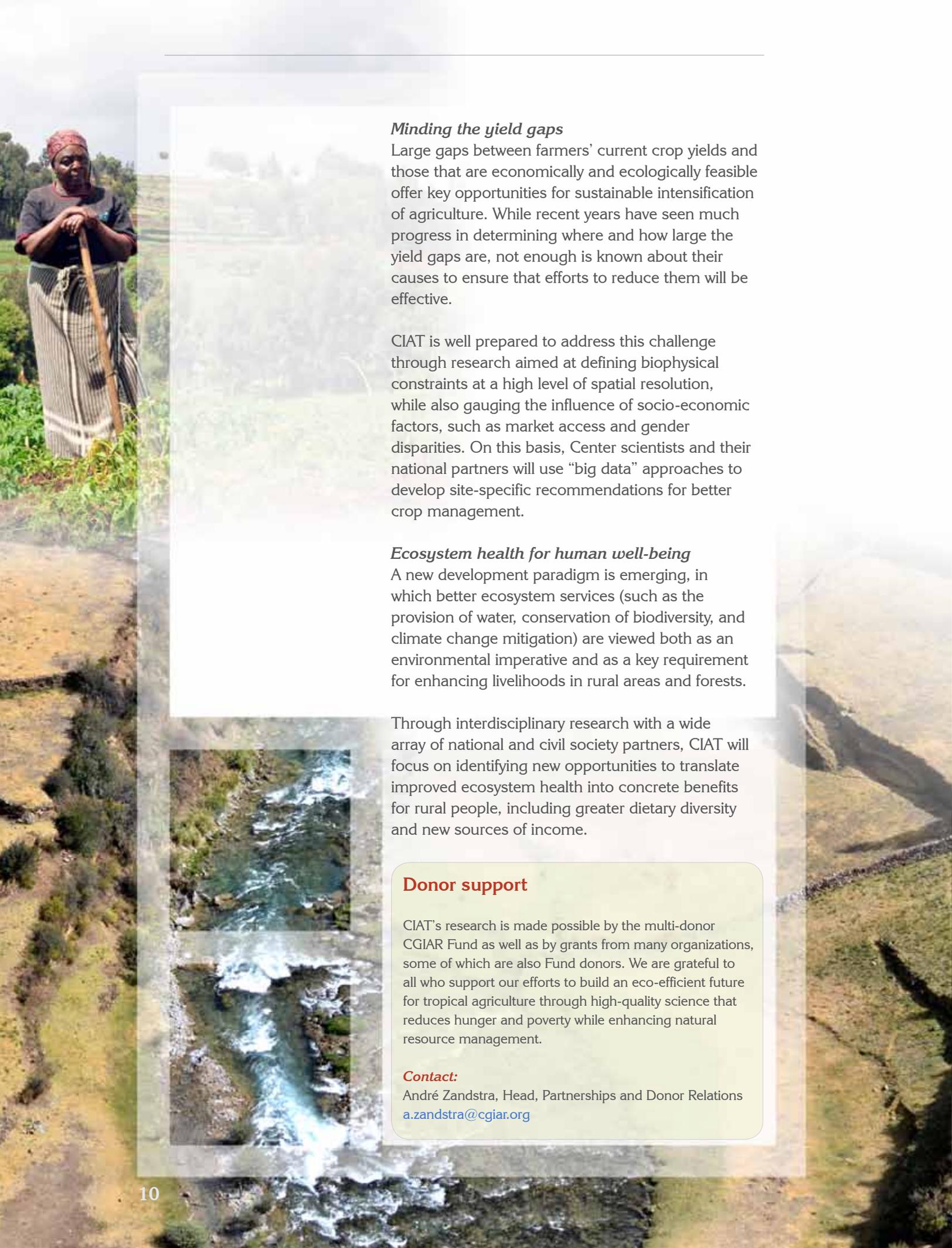
CIAT scientists are responding to this challenge through an initiative called LivestockPlus. It builds on growing evidence that improved forage-based livestock feeding systems can lower emissions and store large amounts of atmospheric carbon deep in the soil. Through vigorous development and promotion of such systems, the initiative will help realize the environmental benefits of forages on a large scale, while also exploiting their demonstrated capacity to raise milk and meat production, and boost rural incomes.

Sustainable food systems for an urbanizing world

Rapid urbanization in the developing world is driving profound shifts in human diets, which are worsening nutritional problems while also leading to greater food waste in production and distribution.

To help put evolving food systems on a sustainable path, CIAT will embark on research aimed at gaining a better grasp of both the urban as well as rural dimensions of agricultural value chains. New knowledge resulting from this work will better inform crop improvement strategies as well as efforts to reduce food waste, boost the efficiency of key value chains, and identify new opportunities for value addition.





Minding the yield gaps

Large gaps between farmers' current crop yields and those that are economically and ecologically feasible offer key opportunities for sustainable intensification of agriculture. While recent years have seen much progress in determining where and how large the yield gaps are, not enough is known about their causes to ensure that efforts to reduce them will be effective.

CIAT is well prepared to address this challenge through research aimed at defining biophysical constraints at a high level of spatial resolution, while also gauging the influence of socio-economic factors, such as market access and gender disparities. On this basis, Center scientists and their national partners will use "big data" approaches to develop site-specific recommendations for better crop management.

Ecosystem health for human well-being

A new development paradigm is emerging, in which better ecosystem services (such as the provision of water, conservation of biodiversity, and climate change mitigation) are viewed both as an environmental imperative and as a key requirement for enhancing livelihoods in rural areas and forests.

Through interdisciplinary research with a wide array of national and civil society partners, CIAT will focus on identifying new opportunities to translate improved ecosystem health into concrete benefits for rural people, including greater dietary diversity and new sources of income.

Donor support

CIAT's research is made possible by the multi-donor CGIAR Fund as well as by grants from many organizations, some of which are also Fund donors. We are grateful to all who support our efforts to build an eco-efficient future for tropical agriculture through high-quality science that reduces hunger and poverty while enhancing natural resource management.

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Cross-cutting tasks

To deliver CIAT's new strategy, we will strive to fulfill key cross-cutting conditions for change over the next 6 years:

- Vigorously pursuing new alliances – particularly public-private partnerships – and reinforcing our current collaboration to ensure the delivery of development impacts in our focus regions.
- Taking steps to ensure that our work empowers and transforms the lives of women and marginalized groups.
- Building stronger capacity for research and innovation among our partners in developing countries.
- Mainstreaming knowledge-management practices in our work to enhance research outcomes through continuous learning.

In keeping with our vision of an eco-efficient future, we will pursue this aim not only in our research but also through improvements in CIAT's operations and infrastructure, aimed at making the Center carbon neutral in 2015.



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Be part of a global *minga*!

In many parts of Latin America, rural people have kept alive the indigenous tradition of convening community members to achieve a collective purpose – called *minga* in the Andean Region. This practice conveys pretty well the collaborative spirit of CIAT's new strategy and of CGIAR science as a whole.

The strategy thoroughly commits CIAT to a collective global effort to address major challenges through inclusive partnerships, resulting in tangible benefits for millions of poor people. To help gauge the effectiveness of the Center's contributions, our strategy sets quantitative targets for strengthening food and nutrition security, creating new market links for smallholder farmers, and making agriculture more environmentally sustainable and climate smart.

We intend for CIAT's new strategy (see link below) to serve as an open invitation for all of our partners and donors to join us in the global *minga* to build an eco-efficient future.

Link to *CIAT Strategy 2014–2020*: <http://ow.ly/ugcuV>



CIAT is a member
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CGIAR is a global agricultural research partnership for a food secure future. Its science is carried out by the 15 research centers who are members of the CGIAR Consortium in collaboration with hundreds of partner organizations.

