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**SmartLessons**  
*real experiences, real development*

## A Harvest of Practical Insights

LESSONS LEARNED IN AGRICULTURE, AGRIBUSINESS,  
SUSTAINABLE RURAL DEVELOPMENT, AND CLIMATE CHANGE



In partnership with Austria, Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, the United States, the Afghan Development Association, the European Union, the Inter-American Development Bank, the Private Infrastructure Development Group, the South Asia Infrastructure Facility.



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## Foreword

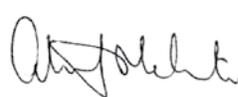
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Agribusiness is a crucial economic sector, for food security of course, for managing water stress and ecosystem services, but also as a source of employment in emerging markets. 70 percent of the world's poorest live in rural areas and agriculture can provide a significant pathway out of poverty for many of them. The past century saw massive increases in productivity in agriculture, driven by both good government policy and the creativity and ingenuity of the private sector, but food production faces yet its biggest challenges in the coming decades. As we are expecting demand for food to grow by over 70%, with land and water availability coming under increasing pressure, agriculture remains a key focus area for the World Bank Group.

This “SmartBook”, aptly titled, *A Harvest of Practical Insights*, presents practical lessons learned by staff from across the IFC and the World Bank, on approaches for engaging in agriculture that have led to success. They came together as part of a “Smart Lesson Competition” that we held internally, in late 2011. The projects and programs depicted in this book span a wide range of countries, regions and agricultural commodities, yet have one common focus: to help people improve their income through agriculture as a way to lift themselves out of poverty. Our objective in sharing these experiences and lessons is to encourage learning from and replication of impactful programs.

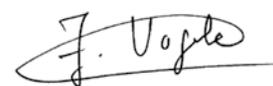
We recognize that our work cannot be done in isolation. The accomplishments presented and lessons discussed were learned by teams who have reached out across organizational boundaries, leveraging the different viewpoints and strengths that come with the Bank Groups investment products and knowledge tools. And this also is a lesson in and of itself.

We hope that you will find these narratives engaging and most importantly, that you will gain some practical insight.



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Smallholder farmer in East Africa.

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## General Lessons

# Sowing the Seeds of Sustainability: A Case Project with Unifrutti, IFC, and Smallholder Banana Farmers in the Philippines

*Smallholder banana farmers are beginning to understand that their old farming methods are contributing to the planet's drying up or suffocating in fields of garbage. They are convinced that they have to change their ways for the good of their farms, their communities, and their children. But what really drives them to adopt new and sustainable practices? What will ensure that they continue to do so? IFC partnered with Unifrutti Philippines to work with farmers to enable them to be certified to the international Sustainable Agriculture Network standards of the Rainforest Alliance (RA).<sup>1</sup> With concerted efforts from Unifrutti (the lead firm) and IFC, smallholder<sup>2</sup> farmers were trained to understand the RA standards and auditing processes, buy into the concepts of environmental and social sustainability, adopt new sustainable practices, and pass the certification audit—all within 12 months. The project began in 2008 and ended in December 2010. This SmartLesson examines the difficult challenges of instituting change, as well as the necessary steps to ensure ongoing sustainability.*

## BACKGROUND

Sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Environmental and social (E&S) sustainability standards in agricultural development refer to farming practices designed to maintain or promote biodiversity and ecosystem integrity and to ensure human welfare and safety. Certification gives farmers a stamp of recognition that they adhere to these sustainable practices.

The E&S standards can be imposed by governments (for example, as a regulation or international trade requirement) or the private markets (for example, supermarket standards). Compliance with these standards can be strictly enforced either by the public or private sector, depending on the political landscape of a country. In the Philippines, government enforce-

ment of E&S-related regulations is weak. Hence, certification in the agribusiness sector to E&S standards has been led by the private sector and imposed by certain overseas markets (such as Japan).

In the banana export industry, the exporters, large local and multinational corporations that also manage corporate plantations, are certified to several specific standards (such as ISO<sup>3</sup>, GlobalGAP<sup>4</sup>, and RA) to meet their buyers' requirements or to enhance their market position as socially responsible suppliers. These corporations have the technical capability and

<sup>1</sup> The Rainforest Alliance ([www.rainforest-alliance.org](http://www.rainforest-alliance.org)) is an international environmental nongovernmental organization that promotes sustainable farming practices.

<sup>2</sup> The smallholders can be cooperatives composed of members owning 1–2 hectares each or a family-type enterprise owning 5–25 hectares and leasing up to 200 hectares.

<sup>3</sup> International Organization of Standards.

<sup>4</sup> Global GAP (Good Agricultural Practices) is the private sector organization that sets the standards for certification of production processes of agricultural products worldwide.

financial resources to readily meet any or all certification standards.

The smallholder banana growers, however, are not as able to comply with E&S standards as are their corporate counterparts. Being on the producing end of the supply chain with little market contact, they lack knowledge of certification standards. With little policing from the government, they do not follow the local regulations on proper use of agrochemicals, waste management, or provision of minimum wages and benefits to their workers. Furthermore, they barely meet the quality standards of premium markets such as Japan, because they have limited access to financing. Their produce is mainly directed to export markets that do not have stringent quality or standards requirements. With a national land reform policy turning corporate plantations over to smallholders, the exporters are increasingly reliant on smallholders to supply bananas. One such company is Unifruitti Philippines, which needed more Rainforest Alliance–certified bananas to increase its market share in the specialized highland banana premium market in Japan. To do this, the company required certified bananas from its smallholders.

## LESSONS LEARNED

*Lesson 1: If you can't offer an explicit price premium for certification, think twice about doing the project.*

The most important questions that the smallholders ask are: will there be an additional increase in their price if they meet the certification standards, and what are the costs involved?

In the pilot phase of the project, the certification premium was not clearly defined, and it caused a lot of discord between the farmer beneficiaries and the lead firm. Certification costs were seen as a new additional burden on the farmers.



Enforcement of rules to protect the environment.

An added expense exacerbates the difficulty of changing behavior and mindset, given a natural inclination to resist change. Although people feel good about protecting the environment, the reality is that it costs money. It is an additional burden that many people—from consumers to producers—do not willingly bear. In smallholder banana farming, profit margins are determined literally in cents; thus every penny counts.

The heaviest costs to meeting the certification standards are capital investments for farm infrastructures—for example, hazard-proof chemical storage and mixing areas, shower and toilet facilities for workers to remove chemical residues that may have stuck to their bodies, water recycling to conserve water, and filtering systems to remove contaminants from water coming from packing sheds before being released back into natural water bodies. These structures are typically not built on smallholder farms.

There are also the annual costs of the auditing process and of maintaining an environmental services team or person on the farm to ensure that standards are maintained.

Fortunately, the lead firm, having the business imperative of sourcing certified bananas from smallholders to expand its premium highland banana market in Japan, gave the incentive of adding a price premium to meeting RA certification. This premium enabled farmers to cover the certification costs and increase their income. We learned that having a clearly defined certification premium makes farmer beneficiaries more committed to adopting sustainable practices.

*Lesson 2: If there is no price premium, determine whether operational cost savings and intangible benefits can provide enough of a business case for farmers to adopt sustainable practices.*

In the second phase of the project, the certification price premium was established only for the highland growers, who represent less than 10 percent of banana growers. To convince the majority (lowland farmers) to adopt sustainable practices without the benefit of price premiums, it is imperative that other benefits (cost savings and any increases in productivity) of sustainable practices be clearly quantified.

By working closely with the farmers, we discovered that cost savings that resulted from sustainable practices could potentially offset the costs of meeting the certification. These cost savings could be achieved by conserving and recycling water, switching from chemical to organic fertilizer, switching from herbicide to manual weeding, and getting new earnings from sorting and selling recyclable wastes.

Clear monetary savings can hold sway in the decision of farmers to adopt sustainable practices even without the price premium. Given the dearth of data from farmers, we needed a good methodology to measure the environmental benefits (such as keeping natural water bodies clear of contaminants from farms) and social benefits (such as fewer health-related problems associated with farm activity) of sustainable farming. We developed an activity-based methodology to measure production costs and the impacts of sustainable practices at various stages of banana production. This can be adopted by farmers and, once applied, will help in determining further impacts of sustainability.

In addition, we recognized some intangible benefits enjoyed by RA-certified farmers. They gained increased confidence and better negotiating power with lead firms, and with banks for financing. The

rigors of meeting international standards require discipline and organizational efficiency. Therefore, certified farms are perceived to be well managed and disciplined, hence sustainable businesses. Because of this, they are able to negotiate better terms not just with their contracted lead firm but potentially with other lead firms when current contract terms end and new ones are negotiated (usually every five years). At least one bank mentioned that farmers who attain international standards certification are more attractive clients.

Meeting the RA certification helps improve compliance with government regulations and demonstrates that the industry can be environmentally and socially responsible. The annual RA certification is the best policing method to ensure not only that farms continually implement sustainable agriculture practices, but also that they comply with agricultural rules and regulations. Furthermore, in light of the tremendous pressure applied by local environmental nongovernmental organizations (NGOs) and government agencies on the banana industry to mitigate the health and environmental risks brought by a perceived unsustainable farming practice, such as aerial spray<sup>5</sup>, the smallholders are now better able to show that they are cognizant of and actively mitigating these risks by being certified to the standards of an internationally renowned environmental NGO.

Finally—as illustration that certification helps—when a major banana export market in the Middle East banned the entry of bananas from the Philippines (as a consequence of international trade

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<sup>5</sup> At the heart of the controversy was the aerial spray practice, which local NGOs and local government units wanted banned. Aerial spray is still, by global standards, the most cost-effective and efficient way of combating the dreaded black sigatoka (fungal) disease in banana plantations. There are mitigating practices to minimize the risk of any adverse effects of aerial spray on workers and community health.

politics), the smallholder farmers were greatly and adversely affected. Smallholders mainly send their produce to the Middle East, because they have difficulty meeting the stringent quality requirements of Japan. The RA-certified smallholder farmers, however, were not affected, because they had preferred supplier status and were able to meet Unifrutti's requirements for the Japanese market.

*Lesson 3: Once a clear business case is established, four project elements are required for successful farmer certification: technical training on certification standards, business training, financing, and availability of local auditing capacity.*

Smallholders need to understand the full implications of adopting sustainable agriculture practices: the cost

and benefits of meeting certification, the resources needed, and the commitment required from them at the beginning and throughout the change process (Figure 1).

Increasing the technical knowledge, business management skills, and financial resources of smallholders is crucial to meeting sustainability standards. Farmers lack access to financing for capital investments, knowledge of sustainability standards, and the organizational capacity to institute reforms in farm operations. In this project, the lead firm providing the finances for farm improvements and the training in RA standards and certification process addressed these challenges. IFC provided the business management skills training that helped farmers embed the principles of sustainability into their daily farming operations (Figure 2).

Figure 1: The Change Process in Adopting Sustainability Standards

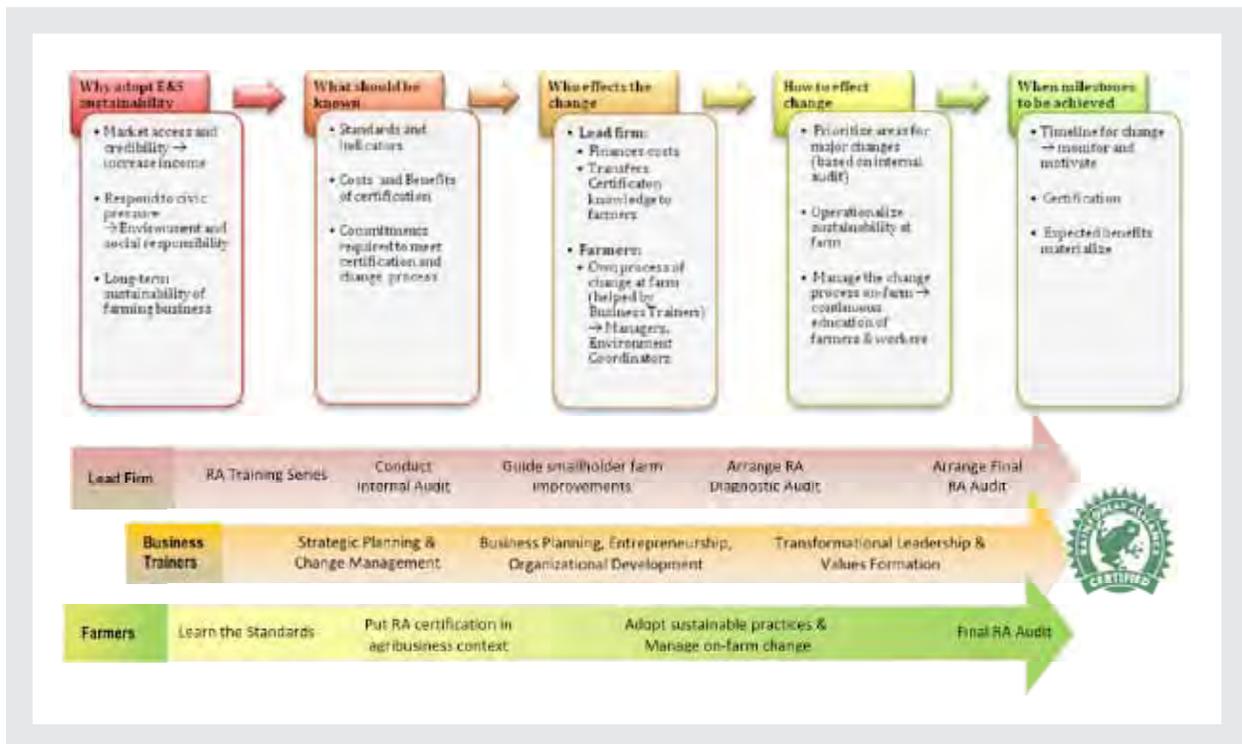


Figure 2: Supporting Mechanisms Needed by Smallholders to Meet Ecostandards Certification



The lead firm, Unifruitti, having the internal knowledge of the standards and the technical processes needed to meet them, mobilized its environmental services unit to train farmers on awareness, documentations, and audit process of RA certification; conduct tours to RA-certified corporate farms to gather ideas on practical ways to meet standards requirements; conduct internal audits to determine critical areas for change and guide farmers in implementation; and arrange the auditing process with RA.

The business training improved the farmers' skills in agribusiness management and organizational development. It helped them better manage the process of complying with the standards and motivating their workers and fellow cooperative members to embrace the new sustainable ways of farming.

Business training modules, such as “Change Management and Strategic Planning,” “Transformational

Leadership and Values Formation,” and “Business Planning and Entrepreneurship,” gave farmers the tools to understand why and how to adapt to a changing world that requires more care for the environment. To ensure that farmers continue to receive this type of training, trainers of a local business training service provider were trained to use these modules. The service provider chosen was one that has been providing annual training to farmers and cooperatives during the last decade.

A DVD featuring the practical steps to sustainable agriculture practices under the RA principles was useful to farmers at RA-certified farms and to other smallholders seeking to understand sustainable practices. It featured the actual experiences of farmers who had adopted sustainability and had met RA certification in the project. Produced mainly in the local language, the DVD can be an effective and inexpensive



Worker without protective equipment (left). Local RA auditor interviews a farm worker wearing protective gear (right).



learning tool that farmers can readily understand and use at their farms to motivate coworkers.

Finally, three Filipinos were trained to become RA auditors. Prior to the project, RA auditors were flown in from the United States or South America to conduct audits (usually in Unifruitti corporate plantations). Having local RA auditors ensures that the auditing—and if necessary, re-auditing—process can be quickly arranged, lowers auditing expenses, and makes farmers more comfortable interacting with them during the auditing process.

The smallholders have acknowledged that, without the significant support provided by the lead firm and the business trainers in guiding them through the certification process, it would have taken them much longer, if ever, to achieve the sustainability standards.

## CONCLUSION

The Unifruitti, IFC, and Smallholders Banana Farmers Project in the Philippines provides key lessons on how to institute change and increase sustainability. Changing mindsets is vital, but it is only the first step. A sound business case and clear quantifiable benefits for adopting sustainable agricultural practices are the key factors in getting farmers to change their behav-

ior. Support services that enable access to finance and that provide ongoing training and education are critical to maintaining sustainable practices.

## ABOUT THE AUTHORS

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# Harvesting the Fruits of Your Hard Work, Frustration, and Patience: Implementing an Agribusiness Project in Kandahar, Afghanistan

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*Excited about your new project in a fragile and conflict-affected state? You have used significant time and resources to identify the most promising sector, narrowed down the needs and barriers, had consultations with a wide range of stakeholders on how best you can help, spotted IFC's additionality, mobilized funds, and fully used all your expertise and experience in designing your project. You have perhaps even run a pilot project to test your approach and incorporated lots of lessons learned in your new "master" project. Now, everything is set, and things can't go wrong. Right? Not exactly. There is still a long way to go. This SmartLesson describes our experiences and lessons learned in implementing an IFC Advisory Services project in Afghanistan that aimed to improve farmers' productivity through introducing new processing practices in this fragile and conflict-affected state.*

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## BACKGROUND

Afghanistan is heavily dependent on agriculture as a source of income and job creation. Fresh and dried fruits alone represent 36 percent of total country exports. Out of those, raisins and pomegranates stand out as two major commodities with high potential for growth, while facing limited competition in international markets. In early 2006, IFC initiated the Afghan Horticulture Export Development Project, working with a group of raisin and pomegranate farmers and traders in Kandahar Province in southern Afghanistan, where 80 percent of employment is related to agriculture and conditions for pomegranate and green raisin production are optimal.

The project focused its interventions on improving performance in production, processing, and marketing on a pilot scale and aimed to build knowledge of successful business models to stimulate system-

wide change. The project introduced new, simple, and affordable production technology based on best practice; trained extension workers and farmers in modern production techniques; and enhanced traders' knowledge of potential markets. Significant project results include the introduction of newly designed raisin drying houses, based on the experience of market leaders, and their adoption and construction by 10 growers.

In April 2008, IFC commissioned an independent consultant to provide an assessment of the results achieved in this pilot project. The assessment report concluded that 1) extension services to farmers and the construction of 10 new-style drying houses had delivered significant increases in quality, efficiency, and productivity; 2) the season's production demonstrated that growers can more than triple output with the new drying technologies; 3) pomegranate exten-

sion activities successfully demonstrated how sorting and grading can support the growers in achieving up to 80 percent higher prices; and 4) the value of pomegranates can be enhanced through basic processing by using simple technologies to make secondary products and capture the value of byproducts.

Building on the success of the pilot project, which was completed in 2008, IFC launched a second phase in five districts of Kandahar in late 2009 to scale up the results and extend its interventions to reach a wider audience. Specifically, the project will 1) improve product quality and increase productivity of green raisin production by farmers by providing training in the application of best practices in post-harvest treatment, 2) develop a supply chain with three to five small and medium enterprises (SMEs) to supply building materials for drying houses and support 100 farmers in building their own drying houses, 3) improve the product quality of pomegranate producers by providing training in sorting, grading, and packaging, and increase value through exploiting byproducts and enabling access to secondary markets, and 4) establish a concrete strategy to build sustainable links between Afghan firms and international companies.

The project will further train extension workers from the local communities and help establish an extension worker association, which will continue to provide fee-based training and advisory services to farmers after the completion of the project.

With secured funding from the Canadian International Development Agency (CIDA), we initiated the implementation of what we thought was a fail-safe project. However, we quickly started to realize that nothing is fail-safe in a fragile and conflict-affected state. Here are some of the key lessons we learned during implementation.

## LESSONS LEARNED

*Lesson 1: Be ready to pay the world's highest prices, in the world's poorest countries.*

The \$1 million budget for the second phase was established on the basis of the cost of the pilot phase, factoring in likely price increases during the two years that had passed since the completion of the pilot project. Taking into consideration two factors—transfer of international best practice and financial strength—our first preference was to hire an international consultant for implementation. The request for expressions of interest (EoIs) was published globally, and several proposals were received from a group of international consultants, including the implementing consultant of the pilot phase. However, the average value of the proposals ranged between \$4 million and \$6 million—four times the budget for this second phase.

Examining the proposals more closely, we realized that all prices had inflated exponentially in just two years. First, nearly 55 percent of the proposed budgets were to cover intense security measures as a result of increased hostile activity in the region. Second, prices for the building materials that were required for the construction of the drying houses had increased almost fourfold, compared to the pilot phase. One kilogram of steel was three to four times the price of what it would be in neighboring Pakistan. Finally, implementation costs seemed exaggerated. The extension-worker fees were budgeted six times higher than what a medical doctor would earn in Kabul; and for the one-year lease cost of a motorbike for an extension worker, we could probably buy two in Kabul.

### THE LESSON:

When planning for a project in a fragile and conflict-affected state, you should exert extra effort to gather the latest data on prices, cost of implementation, and,

most important, the security situation and its cost implications. Calculations cannot be based on old data by just adding official inflation rates, because prices are usually very volatile in conflict environments. Moreover, supply-and-demand forces are unbalanced, and the security situation can change in a minute, resulting in highly elevated security costs.

### *Lesson 2: Go local, but be careful.*

When budgets proposed by the international consultants turned out to be four to six times our available budget, the project team seriously considered pulling the plug on the project. All in all, it just did not seem right to pay at least \$4 million to help only 1,200 farmers. Before giving up, the team sought one other alternative: using local capabilities. An extensive search was conducted to identify local organizations with the ability to implement this project. Twelve Afghan consulting companies and nongovernmental organizations (NGOs) were identified as potential partners, with the help of the World Bank office in Kabul and donors such as CIDA. A call for an EoI was published locally, and seven organizations submitted EoIs for the project.

However, face-to-face meetings revealed that things were not quite the way they looked on paper. One of the seven had no previous experience in the field and lacked the organizational capacity to carry out the activities of the project. The chief executive officer of this NGO could hardly speak English, and it was obvious that the EoI was prepared by an outsider. Finally, four proposals were received; and with further negotiation, the project team reached an agreement with an NGO within the limits of an increased project budget of \$1.5 million. The selected NGO operates in Kandahar, is quite familiar with local conditions, enjoys a high level of acceptance by the local community, and has easy access to local farmers and extension-worker candidates. After the contract was signed, the project officer then spent significant time

and effort to identify the weaknesses of the NGO through open dialogue and incorporated special support components to mitigate those weaknesses.

### **THE LESSON:**

**First**, in fragile and conflict-affected states, do not assume that the only resources that can implement your project are the international organizations that you have heard and read about. Dig deep for local resources. You might be surprised at the available local competencies and capabilities, even for implementing large projects. You might be more surprised when you experience the level of enthusiasm and dedication that local contractors have to serve their own people. So go local, not only by selecting a local organization, but also by being present in the country as much as it takes to establish mutual trust and understanding. Be open with what you can and cannot do. Take time, have patience, and go the extra mile to educate and coach the organization. Investments to enhance the capacity of local organizations will have a sustainable and larger positive impact on the community. Enjoy the satisfaction of your efforts when you receive thanks.

“Thank you, brother Hazem, for your support and cooperation for the benefit of the Afghan people.”

—Program Manager, Afghan Development Association

**Second**, be careful. Do not allow first impressions to guide you. Meet with the people, discuss your project with them thoroughly, and examine their understanding of what is needed. Thorough study will reveal what they can and cannot do and where they will need help. In fragile and conflict-affected countries, great EoIs or proposals do not necessarily mean great partners.

*Lesson 3: Be careful not to contract with an insurgency group to implement your project.*

Although going local seemed to be an ideal solution, it also awakened deep concerns in the project team. Given the situation in Afghanistan, where the insurgents in some cases are infused in the local community, the question was, *How do we ensure that we do not contract with insurgents to implement our project?* Consequently, the project team worked on collecting information on the bidders through cooperating with the World Bank office in Kabul, CIDA, the Canadian Embassy in Kabul, and several other development agencies operating in Afghanistan. Usually, the situation in fragile and conflict-affected states is complex, and sometimes this forces relationships to be structured differently. An in-depth analysis needs to be conducted early before making any commitments.

**THE LESSON:**

Know who you will work with. Start early, and do the integrity due diligence of the organization and its management team well ahead of time. Internet searches do not yield much information in fragile and conflict-affected countries. So allocate extra time, and spend it on collecting information and listening to views from different sources on potential partners.

*Lesson 4: Prepare to develop your virtual supervision skills.*

This project is implemented in Kandahar, where IFC staff are not allowed to visit for security reasons. A major concern at the design of the project was how to monitor the implementation and achievement of project targets. In other words, how could we be sure, while sitting in Kabul or Cairo, that farmers were trained or that the drying houses were actually built? The monitoring plan, constructed early on, consisted of several tools. First, we decided to hire a local independent organization to assess results and

verify achievements, both after the first year of project implementation and at completion. (We already had good candidates for this task as a result of the “go local” process.) Second, a more comprehensive monitoring and reporting requirement than usual was agreed to with the contracted NGO, covering full details of the beneficiaries, including their villages, names, photos, and the GPS coordinates of the drying houses built. Finally, we agreed with CIDA, which is present in Kandahar, to use its local resources to verify the information on project progress submitted by the contractor, because it would be to CIDA’s benefit as donor to confirm the project’s achievements.

**THE LESSON:**

Always think early on how you will monitor the implementation of your project that is running in a remote area where you have limited or sometimes no access. Use local resources, and use technology.

*Lesson 5: Be mindful that wars do not take into consideration your project timelines.*

Because of the volatile security situation in Kandahar, the project still experiences delays in implementation.

Farmers training.



In June 2010, a large military operation started in Kandahar; as a result, many of the farmers in the target districts of Kandahar were not accessible, because they had left their villages and fled to safer areas. The project team, in cooperation with the contracted NGO, accordingly decided to start activities in two of the selected five districts of the province—a shift from the initial plan to intervene in the five districts in parallel. A more flexible project timeline made this change possible, “slicing” the project implementation into smaller components covering batches of activities that could be implemented independently. For example, the project team kept in constant communication with the contracted NGO to identify the safe regions and consequently decided to roll out activities, targeting one-fifth of the farmers at a time and organizing the supply of materials in batches of 25 for construction of the drying houses.

### THE LESSON:

When structuring the project timeline, consider the unforeseen circumstances that may occur and negatively affect your implementation plan. Slice your project activities into smaller components, and always have Plan B, Plan C, and sometimes Plan D.

### CONCLUSION

Initially planned as a two-year intervention back in 2008, the project first took off in March 2010 with the signature of the contract with the NGO, which then started implementation in the field in April 2010. At this writing, the project is in its eighth month of implementation and has managed to implement one-fourth of the planned activities. Both the IFC project team and the contracted NGO needed to explore and implement a series of unusual practices in getting the project to its current momentum. In spite of the slow mobilization and start-up, the project has been able to achieve considerable outputs and outcomes that promise significant added value for the farmers in Kandahar.

Afghanistan has provided extensive practical experience and knowledge that can be used as valuable input for designing and managing the implementation of an advisory project in fragile and conflict-affected states. The key lessons learned have already benefited other IFC advisory activities that were launched after this project (for example, the Business Edge Program for Afghanistan).

What is most important, the entire process of working in Afghanistan and the lessons learned so far have not discouraged our commitment or appetite to work in fragile and conflict-affected states. On the contrary, we believe that the potential role of the private sector in improving the lives of people is much higher here than elsewhere. We just have to be ready to break some of our paradigms, persist in our private sector focus, and plan and follow our work more diligently.

### ABOUT THE AUTHORS

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# Taking Haitian Agriculture to the Cloud: Implementing Google Apps for Government at the Ministry of Agriculture

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*The January 2010 earthquake that devastated Haiti directly affected the infrastructure and personnel of the Ministry of Agriculture, Natural Resources and Rural Development (Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural, or MARNDR). It weakened the ministry's capacity to lead the country's economic recovery and food security improvements, and it set back research, innovation, and extension systems in the agriculture sector. In addition, most of the existing information systems and a vast number of electronic and hard-copy documents, including reports, studies, files, statistics, maps, and accounting data, were destroyed. This was due, in part, to the sheer physical destruction of the earthquake—but also because MARNDR lacked a centralized archiving system. This SmartLesson describes the successful introduction of cloud-computing technology to the MARNDR's information and communications technology (ICT) system as the primary method to manage knowledge and preserve documents for the agriculture sector in Haiti.*

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## BACKGROUND

The January 2010 earthquake was not the first time that a destructive event had struck the information infrastructure of Haiti's agriculture sector and weakened its capacity to perform. Certain political events, including the 2004 departure of President Jean-Bertrand Aristide and the embargo of the 1990s, resulted in similar setbacks—for example, the offices of the Ministry of Agriculture in Port-au-Prince were destroyed in 2004, along with archives and computers.

The agriculture sector is especially important in Haiti—it generates one-quarter of the country's gross domestic product (GDP) and provides half of the country's employment. But for MARNDR to lead the country's economic recovery and provide much-needed government services, the ministry needs access to reliable information and information systems. This

urgency led MARNDR and the World Bank to partner to strengthen the agricultural knowledge-management system of the country by making it resilient to future natural disasters and crises and by adapting it to local conditions.

MARNDR needed to become more efficient and transparent and more responsive to farmers' and the sector's needs. The quality of public agriculture services also had to be improved in a sustainable manner. After an assessment of public agriculture services in Haiti, we determined that MARNDR's information and communications technology system was at the core of the necessary reforms. The ministry faced a number of problems, including the following:

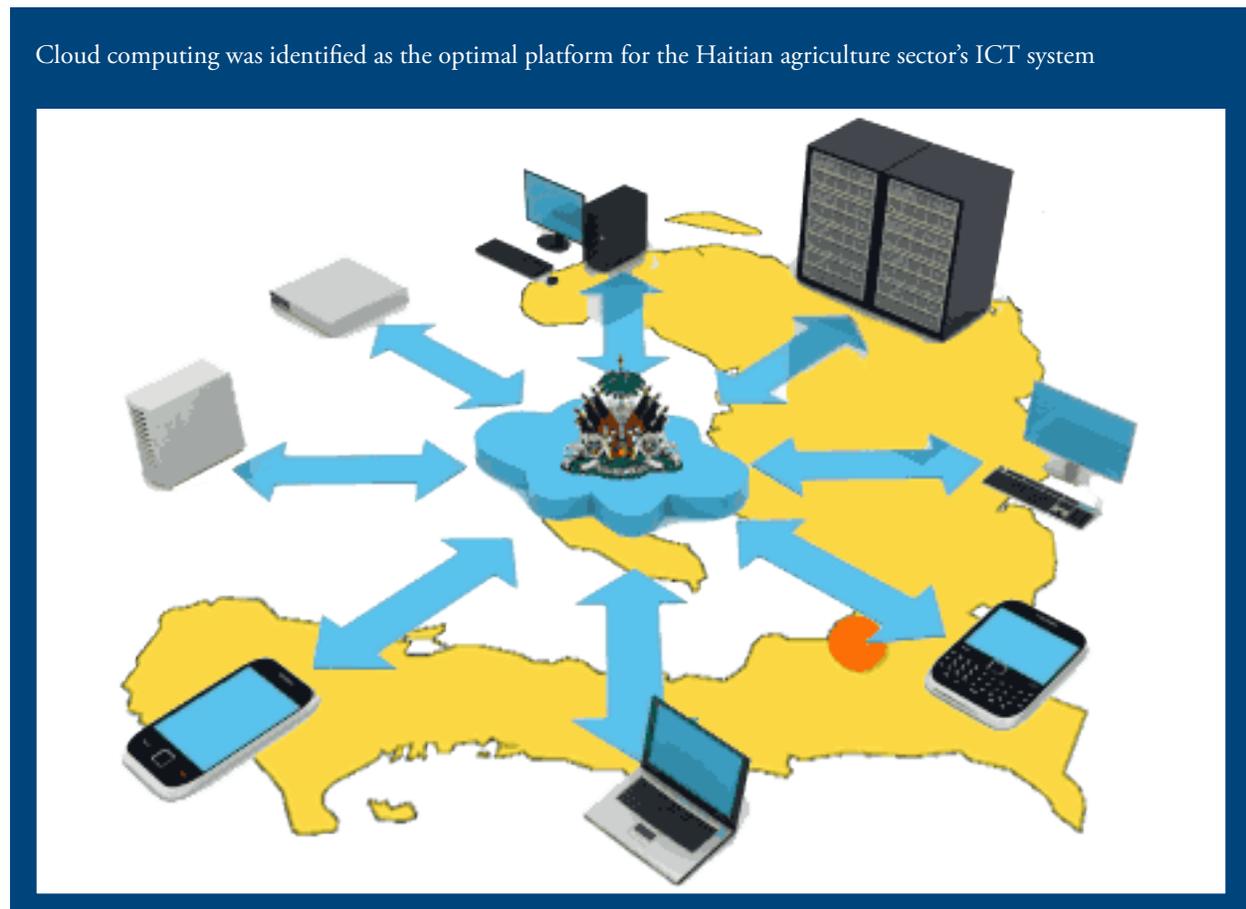
- Low level of official e-mail use by MARNDR staff and extension agents;

- Difficulty making telephone calls and conducting teleconferences—the lack of a landline phone system forced staff to use personal cell phones;
- High costs incurred by staff for electricity, telephone, transportation, and other services;
- Absence of secure and centralized electronic archives for documents;
- Difficulty for farmers and agribusinesses to obtain official forms or make requests;
- Overall reliance on paper systems and outdated communications systems.

The MARNDR system, deployed across a secure and private network for all ministry buildings in the country, helps address some of these issues by giving workers full access to their information across devices (such as desktops, laptops, and tablets) and platforms (such as Windows, Mac, and Linux); allowing them to work in multiple locations; and leaving fewer data on vulnerable physical devices.

MARNDR does not have 24/7 air-conditioned rooms, which makes it difficult and unsustainable to install servers. Furthermore, electricity is not available at night, requiring staff to constantly back up their files.

Figure 1: Cloud Computing



The cloud-computing revolution—in combination with the explosion in the use of mobile and wireless devices—presents an exciting opportunity to bridge the digital gap in rural areas of Haiti (Figure 1). It has enormous potential to change and improve the

main delivery channels for government services (Box 1). Lower prices make mobile phones and other new technologies more accessible, and technological advances allow for more flexibility, greater collaboration between agencies, and increased security.

### *Box 1: Improving Communication through Cloud Computing*

Through the World Bank–financed Strengthening of Agriculture Public Services Project, the Bank and the ministry redesigned the ICT system of MARNDR to be based on cloud technology. The objective was to develop and improve the agriculture sector’s innovation, research, and extension systems, with particular regard to future crises and natural disasters.

The decision was made to implement a cloud-computing platform as the primary ICT system for MARNDR. A relatively new technology, cloud computing allows users, using local computers and an Internet connection, to work on and modify files and use applications that are stored remotely. The Bank facilitated an agreement between the government of Haiti and Google, allowing the Ministry of Agriculture to use *Google Apps for Government*.

This cloud-technology platform, launched in Haiti in May 2011, offers transparent and effective communications, information-sharing, and collaboration tools for MARNDR staff and departments across the country, and also to other government agencies and partners. Apps for Government allows ministry staff to share and modify agendas and documents and to communicate through e-mail, video conferencing, or phone from any device with Internet access. Meanwhile, the files are safely stored on Google’s servers.

The ICT initiative had six components:

1. Installation of network hardware, such as fiber optics and Wi-Fi, at MARNDR offices in Port-au-Prince and in 10 regional offices;
2. Training on the new systems for 200 MARNDR staff and users, with at least 40 hours of training per staff member;
3. A three-week training session for ICT administrators in cloud-computing technology and the Google Apps system;
4. Establishment of sustainable and cost-effective energy sources for the ICT system, such as solar energy, inverters, and batteries (currently no MARNDR office has electricity for a full day);
5. Provision of Internet access through WiMAX and/or satellite;
6. An agreement between the World Bank, MARNDR, and Google to use Google Apps free of charge.

## LESSONS LEARNED

*Lesson 1: To design an ICT system in the agriculture sector, incorporate the needs of remote users and plan for the worst.*

In Haiti, natural disasters, political crises, and even theft have marred the institutional memory of the agriculture sector for decades. However, the 2010 earthquake was a wake-up call for MARNDR to rethink the ICT system of the ministry and the agriculture sector of Haiti in general. Planning for a worst-case scenario, such as the one in 2010 where buildings and equipment collapsed, led to an ICT system that would have to do away with any local physical storage of information.

The system also needed to be equipped with built-in alternatives for when the electricity or Internet would be disconnected. Given the daily limitations and characteristics of ICT in Haiti—the need to access materials from rural areas, constant electricity cuts, and the reliance on cell phones rather than landlines—a solution involved a combination of cloud computing, solar electricity, uninterruptible power supply (UPS), laptop and smartphone platforms, and three different Internet connection technologies (to ensure a backup option).

Google Apps for Government also allows for offline use, and users can access their mail, calendar, and documents when they do not have an Internet connection. When users reconnect, Google Apps automatically sends any outbound messages and syncs updates to other documents. Incorporating these features will help prepare the ministry for worst-case scenarios.

Of course, enabling ministry staff to work from multiple locations raises new security concerns. Previously, security reasons demanded that staff only work from government offices, a policy that had to

be reviewed for cloud computing to be effective as an ICT platform. To maintain security for remote access, the Bank helped MARNDR introduce a two-factor authentication that relies on a password and a code provided by text message. Staff received mobile modems to connect to the Internet, since being able to work from home or a remote area through Internet connection or mobile phone was a key aspect of the project.

*Lesson 2: Enlist extension agents to help introduce a new ICT system to farmers and agribusinesses.*

The new ICT platform also needed to respond to the needs of the stakeholders in the agriculture sector—farmers, researchers, and agribusinesses. The extension agent is a pivotal actor, linking these groups with the public sector. Finding an ICT solution that extension agents were comfortable with was an essential part of the rapid adoption of new technologies in Haiti. MARNDR has conducted tests with extension agents by collecting and disseminating real-time food-price data from different remote locations within Haiti, comparing the previous handwritten system to the updated ICT system. Users seem to be using more price data for decision making, though no formal evaluation has been conducted yet.

*Lesson 3: To build local capacity and limit staffing requirements, train ICT specialists—both public and private sector—on cloud computing.*

One of the key success factors has been creating in-country capacity to administer and service the new ICT platform. Cloud-computing applications were uncommon in Haiti, so significant training was built into the project, for both MARNDR staff and the IT firms that would eventually provide services to the

ministry. Over 200 users throughout the country will be given 40 hours of onsite training. As a result of the introduction of cloud-computing technology in MARNDR, three firms in Haiti now offer their own training in cloud computing and Google Apps.

It was also important to build capacity within the ministry. Only four ICT staff members are required to maintain the new system in the ministry; as a result, MARNDR can devote funds to other areas. Today, MARNDR has a reduced ICT unit supervising one of the largest ministries in the country. This low ratio of ICT staff to total ministry personnel would not be possible without cloud computing; maintaining servers and the internal network alone would require at least four times as many.

## CONCLUSION

The 2010 earthquake, destructive and horrific, forced MARNDR to rethink its ICT infrastructure. One positive result has been the implementation of a cloud-computing system for MARNDR, conducted with Bank support. Haiti now joins such jurisdictions as the District of Columbia, the city of Los Angeles, and the state of Arizona in using Google Apps as its primary ICT platform. The new system allows past and future agricultural knowledge to be protected, shared, and used, even in times of crisis, and makes the agricultural innovation and extension system more effective and resilient.

## ABOUT THE AUTHORS

Diego Arias is a Senior Agriculture Economist in the Latin America and Caribbean (LAC) Region of the World Bank. He has extensive experience working on agriculture and rural development projects that foster innovation and strengthening of public sector institutions. Diego has been working with the agriculture sector of Haiti since 2003.

Nicolas Weber is an expert in cloud-computing strategies. Since 2008, he has been working with the government of Haiti, the World Bank, the International Development Bank, and the U.S. Department of Agriculture. He has over 25 years of senior engineering leadership experience in West Africa, the Middle East, Europe, and Latin America and the Caribbean.

Approved by Ethel Sennhauser, Sector Manager, Agriculture and Sustainable Rural Development Unit, LAC Region.

# Fish Farmers Meet New Technology

## Raising the Aquaculture Productivity of Small Farmers in Assam

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*The Assam Agricultural Competitiveness Project (AAP) is exactly the kind of endeavor the World Bank experts warn others about. It is overly complex and ambitious—attempting to integrate the work of seven line departments with 15 interventions (see Figure 1). One of the real successes of the AAP has been intensification of fish farming. So far, the Fish Intensification program has improved the lives of nearly 43,000 families and increased fish production by some 7,000 tonnes annually. And it generates an additional gross income of about \$12.25 million per year, of which about half is incremental income (extra money in farmers' pockets) for small, marginal, and landless farmers. This SmartLesson describes the approach used in the program's two components—ponds and tanks<sup>6</sup>—and the positive changes that have resulted.*

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### BACKGROUND

Fish consumption is extremely popular in Assam. However, recent estimates indicate that the state imports about 40,000 metric tons of fish annually, worth some \$60 million. The AAP baseline survey revealed that fish yields were low among the small-scale farmers who were the project's beneficiaries (for example, 500 kilograms per hectare in ponds and 875 kilograms per hectare in community tanks).<sup>7</sup> The survey showed low levels of management. Typically, a few small fingerlings were released once a year, with no regard for either stocking density or quality. Little, if any, feeding was carried out, and there was no attempt to manage the water's pH.

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<sup>6</sup> A tank is a large-scale traditional water-catchment system used in South Asia to store rainwater for surface irrigation.

<sup>7</sup> Larger, more commercial fish farming yields were typically about 1,000 kilograms per hectare per year.

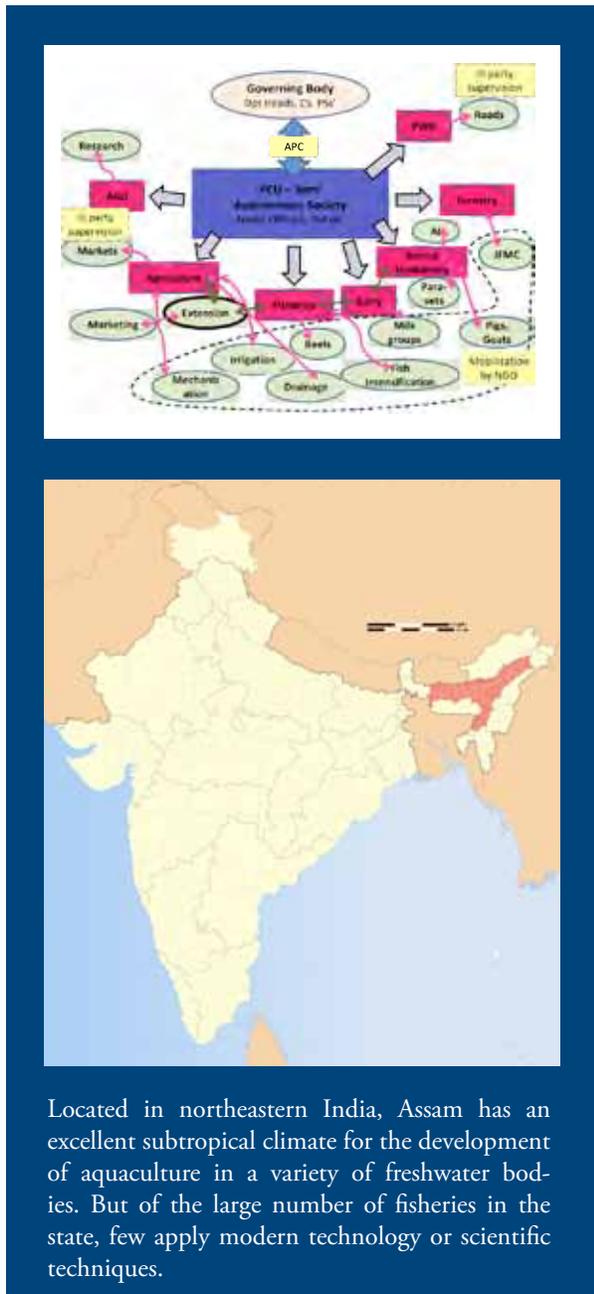
### LESSONS LEARNED

*Lesson 1: Develop solutions that directly address the small farmers' needs.*

Fish farming is an enterprise that is particularly suitable for farmers with small areas of land, because it can generate very high incomes from such areas. In the irrigation-tank enterprises, which are community based, many of the farmers are landless. The technology is scale neutral; that is, needed investments are related to the size of the water area farmed, rather than large individual investments, which are more suitable for large-scale farmers.

Based on proven best practices, and with the help of a specialist fish consultant, the project developed a semi-intensive production package. The main elements are specific stocking densities (6,000 fingerlings per hectare), the introduction of larger fingerlings, the use of lime to deacidify the water (1 metric ton per hectare), and much greater use of fish feed. This higher

Figure 1: Assam Agricultural Competitiveness Project



level of inputs was expected to result in fish yields of 3,000 kilograms per hectare per year. The unit cost of production would be Rs<sup>8</sup> 30 (about \$0.66) per kilogram, as compared with a market price of about Rs 70 (\$1.55) per kilogram.

*Lesson 2: Make it possible for farmers to test the new techniques on their own farms.*

Enabling smaller-scale farmers to directly try out the new techniques on their own farm was far more convincing than the traditional approach of asking them to visit a field trial. The project used nongovernmental organizations, operating at a district level, to mobilize CIGs (common interest groups) of typically 8–20 pond fish farmers and CTGs (community tank groups) of 10–50 people who collectively farm irrigation tanks. These groups received four one-day training sessions covering all aspects of prestocking, stocking, and poststocking management of pond and tank operations. Progressive local fish farmers served as resources.

*Lesson 3: Provide a smart subsidy (time-bound, targeted, and transparent)—and balance it with sound advice to help farmers handle the income spike.*

The project provides a one-off 90 percent grant for fish inputs and a 50 percent grant for civil works (pond and tank renovation and clearance). During training the point is strongly made that this is a single opportunity for farmers to make a “super profit” because of the combination of input subsidy and increased production. The message is clear: this one-time windfall should not be wasted; it should be saved for use as working capital in the subsequent year. This subsidy helps overcome two of the key difficulties that projects face:

<sup>8</sup> Rs = Indian rupees.

- Getting farmers to actually take up new technology or new techniques; and
- Overcoming the problems that poorer or smaller farmers have in affording the working capital required for these more intensive, higher-input systems.

*Lesson 4: Have appropriate procurement and financial safeguards in place.*

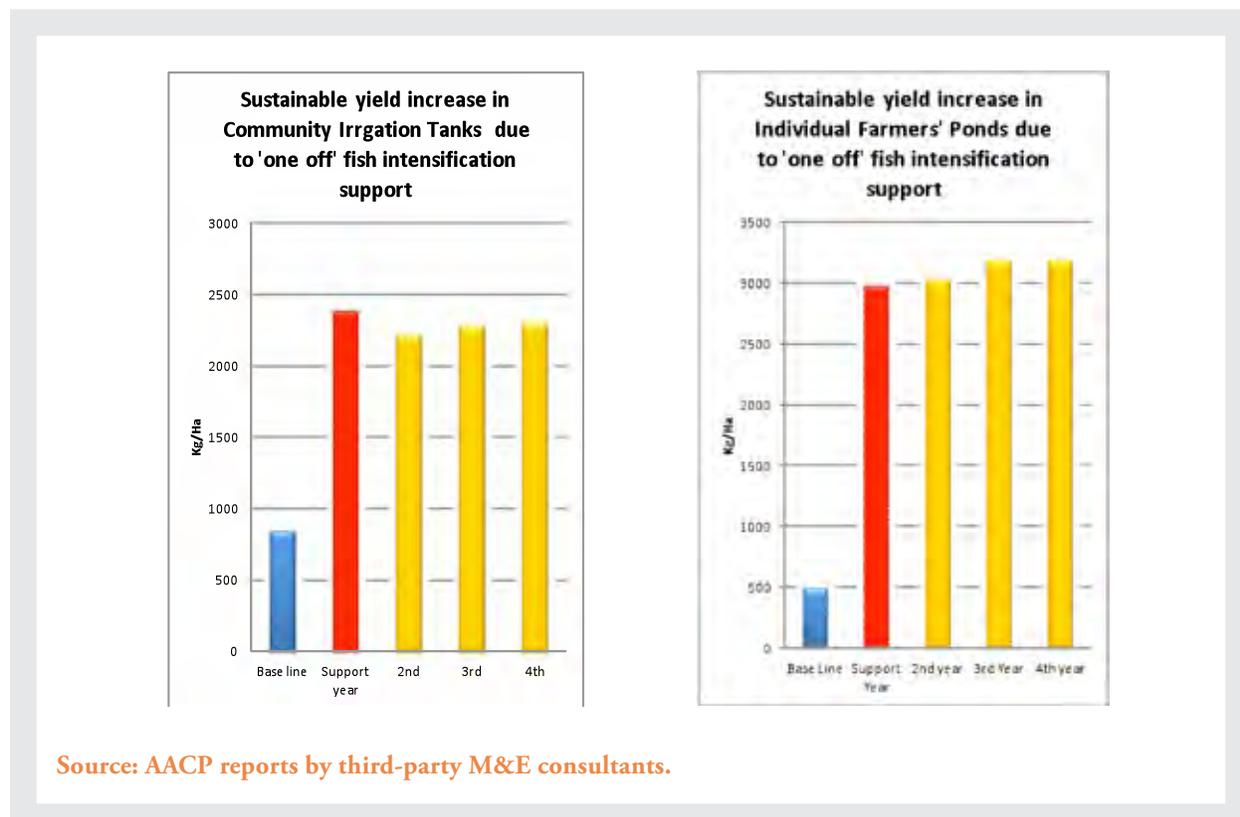
The project used community procurement, based on preapproved district input costs. The process was verified by the social audit committee of the community groups and based on the community operation manual. A random sample of subprojects was also subjected to physical asset verification visits.

*Lesson 5: Measure the results.*

The project’s third-party M&E (monitoring and evaluation) consultants have measured yields both in the support year and in subsequent years (see Figure 1). This measuring of results has proven the sustainability of the improved yields and found the following:

- 87 percent of beneficiaries continued with improved production techniques.
- There are significant spillover effects as nearby farmers also take up the technology.
- Each beneficiary in the Fishery Ponds component will have benefited by some Rs 5,560 (\$123) per year.

*Figure 1: Sustainable Yield Increases in Tanks and Ponds*



**Source: AACP reports by third-party M&E consultants.**

Fish farmers are able to apply their new knowledge directly to their own work.



- Each beneficiary of the Tanks component will have benefited by Rs 2,080 (\$46) per year.
- Of the 43,770 beneficiaries, 41 percent are landless, 42 percent are marginal farmers, and the rest are small farmers.
- 13 percent of all the beneficiaries are women.

## CONCLUSION

This approach has proved very popular, bringing a radical change to fish farming in Assam. Altogether, the project has covered a water area of about 2,500 hectares of individual farmers' ponds, each one about

0.1 hectare. In total, 26,468 farmers have benefited from 1,832 CIGs. The community tank program covers 461 hectares and 456 tanks and works with a total of 16,311 landless, small, and marginal fish farmers.

Beneficiaries are now aware of maintaining specific stocking densities. They understand the importance of maintaining an optimum water pH through the application of lime (CaO) and the necessity of using quality fingerlings. As a result, the farmers have increased their fish productivity by 200–500 percent.

What is proving to be even more impressive is that these changes in production technology now appear firmly embedded into the way these fish farmers operate. The reason is believed to be twofold:

- Beneficiaries have clearly taken onboard that this is a one-off opportunity to make a super profit, and they have saved some of this money for their working capital in subsequent seasons.
- Farmers are not just observing an experiment or a field pilot; they are directly engaging with the positive impact of the technology.

## ABOUT THE AUTHORS

Grahame Dixie joined the World Bank in 2006 as the Agribusiness and Marketing Specialist in South Asia. For the last year, he has worked as the Agribusiness Unit Team Leader in the Agriculture and Rural Development Department. Grahame was the Task Team Leader of the Assam Agricultural Competitiveness Project from the midterm review in late 2007 until January 2011.

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Lessons on Food Security

## Grain by Grain: From Punjab to Global Lessons from the Breadbasket of India

*Wheat is a staple of basic nutrition in India—from open-flame soft chapati to tandoor-fired crispy roti—and hence is a matter of national importance. The Food Corporation of India (FCI), an undertaking of the government of India, is responsible for distributing wheat from producing states to the rest of the country at subsidized prices to ensure the 330 million poorest individuals access to basic sustenance. Now as a result of food-security policy reform, rising commodity prices, and bumper harvests in recent years, India is faced with a problem of plenty: how to store the surplus grain! This SmartLesson is the story of how IFC worked with multiple stakeholders to provide a solution to the problem—and some lessons we learned along the way.*

### BACKGROUND

At the end of FY 2010, India had a stockpile of more than 16 million tons of wheat, 130 percent higher than its minimum buffer norm of 7 million tons.<sup>9</sup> Between rice and wheat, the stockpile totaled nearly 61 million tons. With only 42 million metric tons of available storage in covered godowns (warehouses), the remainder is stored in makeshift covered area plinth (CAP), or platform, facilities.<sup>10</sup>

Because rice has priority in covered godowns, wheat is largely stored in CAPs, which are susceptible to losses and rotting. With 25.4 million tons of wheat procured in India in FY10 at the then minimum sale price of Rs<sup>11</sup> 10,800 per ton, even a 2 percent loss costs the government nearly \$110 million per year.<sup>12</sup>

In Punjab, the “breadbasket” of India, agriculture contributes almost 40 percent to the state gross domestic

product (GDP), compared with the national average of 26 percent. Roughly half of the 16 million-ton stockpile is stored in Punjab, with 6.5 million tons stacked in CAPs. The government of Punjab and its Ministry of Food and Civil Supplies recognized the urgent need for improved storage of the 6.5 million tons.

Given Punjab’s production capacity relative to the rest of India, the Food Corporation of India steps in to procure and distribute wheat to less productive states through the Public Distribution System (PDS). FCI purchases wheat from the government of Punjab’s grain procurement agencies and reimburses the agencies for storage costs. Thus, any initiative by the government of Punjab would need the blessing of FCI.

In 2009, the government of Punjab asked the World Bank to help resolve the storage gap, and the Bank asked IFC to step in. IFC’s Public-Private Partnership (PPP) Transaction Advisory team in New Delhi responded with a concept for a modern storage PPP and soon thereafter was hired as lead transaction advisor to the Punjab State Grains Procurement Corporation Ltd. (PUNGRAIN).

<sup>9</sup> Kaushik Basu, *The Economics of Foodgrain Management in India* (New Delhi: Chief Economic Adviser to the Union Finance Ministry, September 2010): 25.

<sup>10</sup> Planning Commission Concept Paper (September 2011): 3.

<sup>11</sup> Rs = Indian rupees.

<sup>12</sup> Calculation: 25.4 metric tons x 2 percent x Rs 10,800 per ton ÷ 50 (Rs 1 = \$50).

FCI had previously contracted a grain storage silo PPP in Punjab through a business model that incorporated transport and logistics in addition to storage. IFC had to prove to the previous silo project champions that the new, simpler silo business plan was a step in the right direction and to the officials who favored cheaper (and lower quality) storage that the higher rental rate would offset losses.

The project was awarded in May 2010, but due to the hurdles remaining between the government of Punjab and FCI, the concession agreement was not signed until July 2011.

## LESSONS LEARNED

*Lesson 1: How to address a weight problem when the subject does not admit that he has a weight problem: refocus the argument.*

On December 12, 2011, Indian Food Minister K. V. Thomas declared that on FCI's account "no stock of wheat and rice got damaged due to insufficient storage space."<sup>13</sup> While IFC was anecdotally apprised of losses of grain of up to 20 percent due to poor storage, the team also encountered other statistics, in line with the food minister's statement, that attempted to demonstrate zero losses—and even gains in volume due to moisture. Thus, in proving that the silos PPP represented value for money, we could not make an assumption about the actual loss.

Instead, we illustrated the breakeven point of losses where silos would make economic sense. This separated the argument from a debate on "what is the right loss figure?" to "the government of Punjab and FCI should think about reforms if they believe losses could be over 3 percent per year, either now or in the future."

By multiplying the minimum sale price (MSP) for wheat (FY10 MSP Rs 10,800 per ton) by 50,000-ton capacity and the estimated loss from *not* storing in silos, one can arrive at the estimated fiscal loss. For example, a 1 percent estimated loss would result in an Rs 54 lakh<sup>14</sup> (\$108,000) opportunity-cost gain for silos.<sup>15</sup>

The rate at which FCI was reimbursing PUNGRAIN (Rs 890 per metric ton per year) implies an additional cost of the silos PPP of Rs 285 per metric ton per year,<sup>16</sup> or Rs 142.5 lakh (\$285,000) for 50,000 metric tons of storage in Year One.<sup>17</sup> Solving for the breakeven loss (L):

$$\begin{aligned} \text{PPP Storage Charge (Rs)} - \text{FCI Reimbursement Rate (Rs)} &= \text{MSP (Rs)} \times L\% \\ \text{Rs } 1,175 / \text{ton} - \text{Rs } 890 / \text{ton} &= \text{Rs } 10,800 / \text{ton} \times L\% \\ L &= 285 / 10,800 = 2.6\% \end{aligned}$$

With **2.6 percent wheat loss or more**, the silos are more economical (see Figure 1).

*Lesson 2: If the roti is not perfectly round, is it still worth eating? (Yes.) Don't attempt to change everything!*

IFC reviewed the entire value chain of the grain procurement and distribution system (see Figure 2). In our feasibility analysis, we debated the merits of a

<sup>13</sup> Press Trust of India (December 12, 2011).

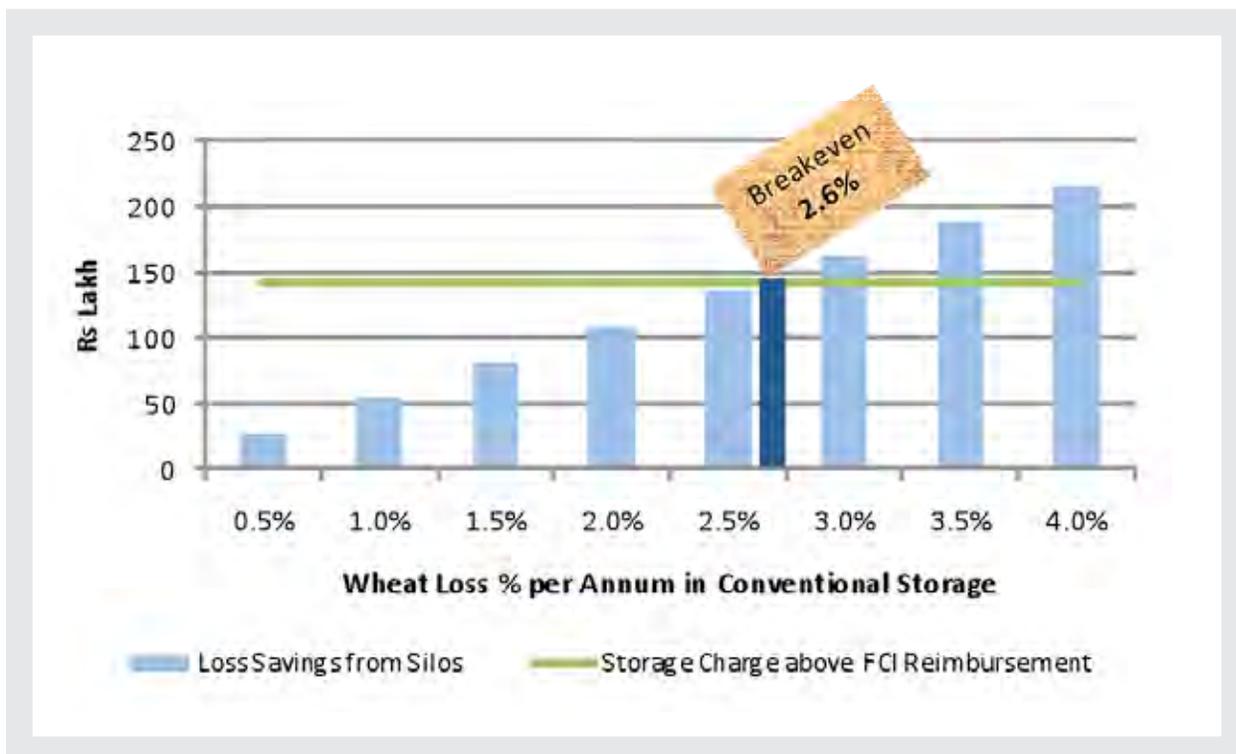
<sup>14</sup> Lakh indicates a multiple of 100,000.

<sup>15</sup> 50,000 tons of wheat x 1 percent loss x minimum sale price of Rs 10,800 per metric ton = Rs 5,400,000 (\$108,000).

<sup>16</sup> Difference between the PPP Storage Charge of Rs 1,175 per metric ton per year and FCI reimbursement of Rs 890 per metric ton per year = Rs 285 per metric ton per year.

<sup>17</sup> The Storage Charge increases by a formula devised in the Concession Agreement, taking into account India Central Warehousing Corporation storage rates, taxes on the Minimum Support Price of wheat, and Wholesale Price Index (a proxy for inflation). Thus, it will not always be Rs 285 per ton difference from the FCI reimbursement rate.

Figure 1: FCI Additional Payout for Silos



bulk-handling system compared with a bagged-grain system and presented our findings for a more efficient system to the governments of Punjab and India. We acknowledged the political bottlenecks in effecting any change to the system (namely concerning the bagged dispatch and distribution through commission agents), but we held to our holistic view of a better system to see whether we could make a difference.

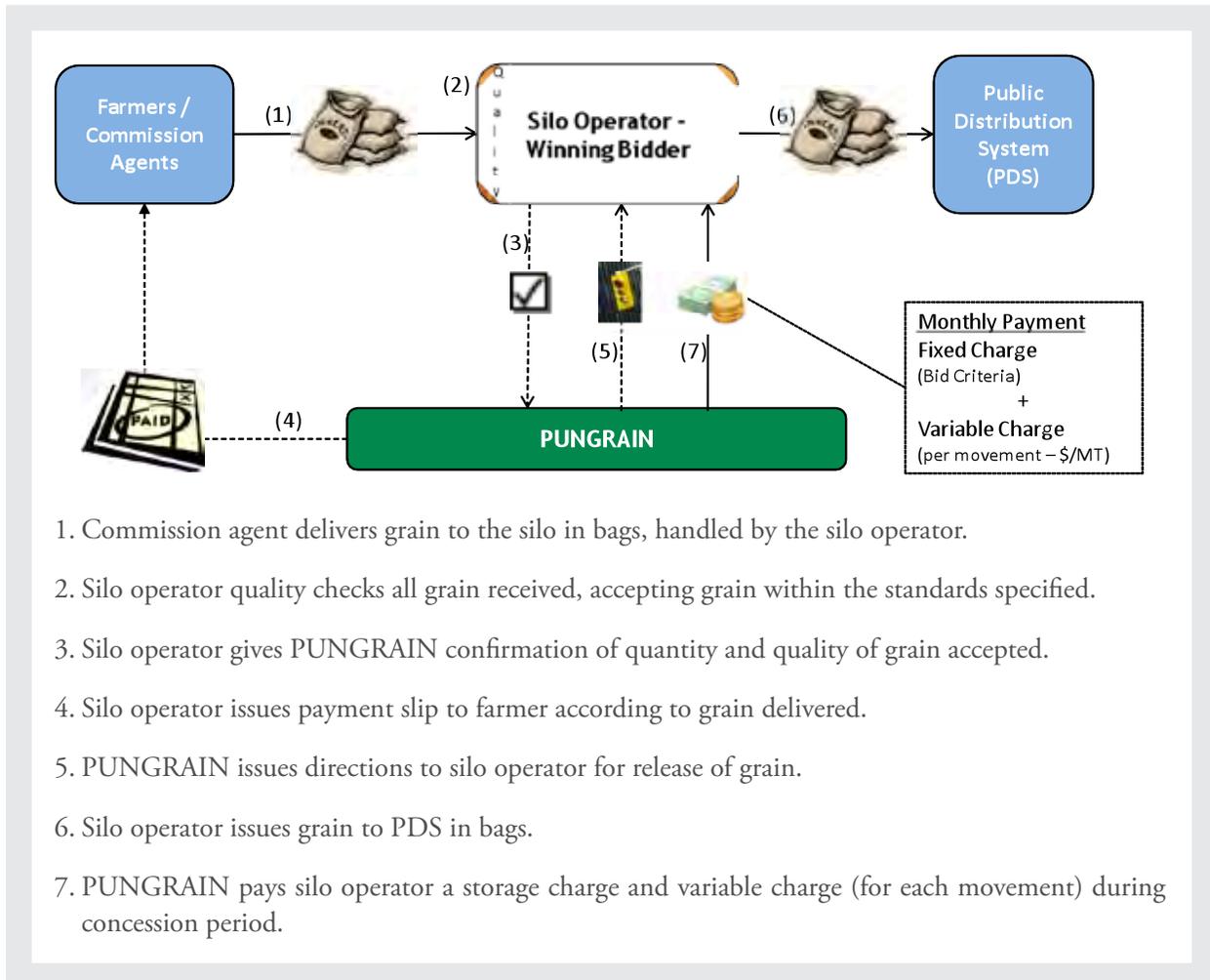
The client’s singularity of purpose helped us focus and rethink phasing of reforms. The final project structure centers on introducing an efficient storage system while allowing for future reforms in transportation and handling. **Although it is ideal to strive for holistic system reforms, project-level interventions that achieve some but not all goals can serve as an engine for broader changes.**

*Lesson 3: Breaking bread with the client—early in the subcontracting process is better than later.*

IFC subcontracts certain work to consultants who are hired according to World Bank Group procurement policies. Typically, client approval is not necessary, because the contract relationship is directly between IFC and the consultant. In practice, however, consultants have to work closely with the client. In this project, PUNGRAIN had strong views on the initial technical consultant shortlist that IFC shared once it had already notified the consultant bidders.

Realizing that the difficulty of hiring a consultant not favorable to the client could be fatal to the project, IFC restarted the procurement process, delaying the project timeline by three months. **IFC would do**

Figure 2: Grain Movement in Punjab



**well to seek the client's buy-in at the procurement shortlisting stage to preempt any conflicts otherwise unknown to IFC.**

## CONCLUSION

Private sector solutions for grain storage represent an IFC intervention to a highly developmental sector, with high-stakes implications for food security. In India, we have seen a sea change of policy attention since the start of the project in early 2009. Agricul-

tural storage is now an eligible sector for Viability Gap Funding from the government of India, an amendment for which IFC had lobbied to ensure economic feasibility of projects and alleviate the fiscal burden at the state level. The Punjab Silos PPP project represents only a piece of the food distribution value chain, but it demonstrates a transformation in policy thinking on how to more efficiently feed a country's population. The government of India has now set out to develop a 2 million-metric-ton pilot of similarly modeled grain silos PPPs throughout India in

consumption centers, addressing a gap in the ability of receiving states to store grain beyond the harvest season.

## SCATTERING OUR GRAIN

Admitting its imperfections but glowing in its innovative solution to a global food security problem, IFC endeavored to take the lessons of Punjab, India, to other geographies. The first example of replication is in neighboring Pakistan, where the topography and grain procurement system are broadly similar to that of India. IFC is supporting the governments of Sindh and Punjab, Pakistan, on silos projects representing more than 1 million metric tons of wheat storage, adding certain elements (such as ancillary land development availability and wheat grading) to the complexity of the projects.

IFC also has indications of significant interest in similar projects from Sub-Saharan Africa and East Asia, where grain losses and rotting are also prevalent. Governments and procurement agencies are realizing that they can defer large upfront payments on storage facilities and outsource the technical operations to private sector experts. Here we have “farmed out” the small pilot project in Punjab to catalyze global reforms in a priority sector.

## ABOUT THE AUTHORS

Jay Lurie is an Associate Investment Officer in IFC Advisory Services in Public-Private Partnerships, South Asia, and a member of the global agribusiness PPP sector team. Based in the New Delhi office since joining IFC in 2009, he brings previous experience in infrastructure finance and capital markets from Macquarie Capital, Credit Suisse, and UBS.

Neeraj Gupta is a Senior Investment Officer in IFC Advisory Services in Public-Private Partnerships, South Asia, and leads the global agribusiness PPP sector team. He was the Project Leader for this project. Prior to joining IFC in 2007, Neeraj had over 13 years of experience in management consulting firms such as PwC and in the World Bank.

Approved by Sujata Lamba, Senior Manager, IFC Advisory Services in Public-Private Partnerships, South Asia; Vipul Bhagat, currently Chief Investment Officer, IFC Advisory Services in Public-Private Partnerships (Manager of the PPP Business Line in South Asia at the time of the transaction).



# From Crisis Response to Sustainable Strategy: Addressing Food Security in Nepal

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*Emerging from more than a decade of conflict—and subject to significant geographical, economic, and social disparities—Nepal has struggled to meet the food needs of its population, despite a heavy reliance on agriculture. Limited arable land and limited access to market infrastructure have made some areas particularly food insecure, resulting in increased migration from these areas because of distress and lack of opportunity. In 2008, the World Bank began working with the Nepalese government through the Nepal Food Crisis Response Program (NFCRP) and since 2004 has supported the Poverty Alleviation Fund. This SmartLesson shares insights gained during this ongoing support.*

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## BACKGROUND

Nepal has enormous geographic and social diversity. Its elevation ranges from less than 100 meters (328 feet) in the Terai to the 8,800 meters (29,000 feet) of Mount Everest. The country's population of 26 million people, 14 percent of whom are currently food insecure, includes 100 caste or ethnic groups, according to the 2011 census.

Food prices are constantly increasing, and transport costs for this landlocked and politically fragile state can add significantly to the cost of food and other essential items in remote communities. Nepal's national annual food price inflation remains about 16 percent. Since Nepal's poorest households spend more than 75 percent of their income on food, high prices will continue to frustrate efforts to alleviate poverty. Natural disasters or political instability can affect the transportation network throughout the country, which adds to the challenge of transporting food. In addition, the country has a high dependency on rain-fed agriculture and has experienced a series of droughts in food-insecure areas.

As in much of South Asia, malnutrition levels in Nepal are alarming. An estimated 39 percent of children under five years of age are underweight, and 49 percent suffer from stunting, according to the 2006 Nepal Demographic Health Survey. Nepal's children also suffer from vitamin and mineral deficiencies: the prevalence of anemia is 74 percent in children under two years.

Communities in marginalized areas in Nepal are highly vulnerable to internal and external factors, such as increasing global food prices, political instability, and natural hazards. Despite remittances that provide some level of succor for these communities, rising expenses make it difficult for remittances to translate into long-term income-generating opportunities for these households.

The NFCRP began in 2008 as an emergency response. The strategy was to access food and basic needs for vulnerable households in the short term in food-insecure districts. Using a community-based investment approach, Nepal responded with investments in critical infrastructure, such as roads, bridges, irrigation

schemes, and construction and rehabilitation of community buildings. In 2010, the food crisis response incorporated a more comprehensive, longer-term strategy to build a better system and increase resilience in Nepal's most food-insecure areas through a market approach that encouraged income-generating investments and improved infrastructure.

## LESSONS LEARNED

*Lesson 1: Show them the bill! Help the government see the true cost of short-term responses, which do not always address long-term needs or help create a change in perspective.*

Assess the cost involved in a food-security emergency response as opposed to a long-term poverty-alleviation strategy. A short-term strategy requires high costs in a short period and high involvement of donors, and returns are limited to ensuring that those who are most chronically food insecure are supported during lean periods. By contrast, a long-term strategy requires sustained lower levels of expenditure over a long period of time and higher government involvement, and returns are proven to be higher.

For the past 15 years, donors have responded through short-term aid to the World Food Program and other agencies to provide relief to chronically food-insecure areas. The government has not seen the full cost of this effort, because much of the support is off-budget and through emergency humanitarian response. The country receives an average of \$60 million to \$70 million per year from donors for feeding food-insecure populations. Over the last three years, the country received an average of \$50 million per year from donors for feeding food-insecure populations. This approach will eventually translate into higher returns to healthier human capital—if support is sustained. However, applying the resources to a poverty-alleviation strategy may well translate into a higher-value human capital

in the long term, and it might also provide medium- and short-term solutions to vulnerable households, building a foundation for a more sustainable self-support strategy, with high returns from appropriate infrastructure and income-generation investments.

For instance, the impact evaluation of the Nepal Poverty Alleviation Fund (PAF) estimated that an investment of \$33.83 million on income-generating activities yielded a return of \$71.70 million for nearly 800,000 beneficiaries, or a return of 74 percent. The return on PAF investments in infrastructure is estimated to be 140 percent. The overall economic return of PAF investment is 79 percent.

To help the government increase awareness of the cost of short-term, year-on-year responses, the NFCRP team worked with the Ministry of Local Development and the World Food Program to reorient the public works program toward agriculture asset creation as a way to provide livelihood opportunities to the food insecure. This process will also help the Ministry of Local Development identify vulnerable households that will require long-term support through safety nets and those that will eventually be able to move toward a more food-secure status through the use of the assets created by the public works efforts.

*Lesson 2: Understand the context—and build on existing delivery mechanisms.*

Use existing strengths. Post-conflict countries don't have strong service-delivery mechanisms, and communities know what they need. The food crisis response in a post-conflict environment required a delivery mechanism for the implementation of a short- and longer-term strategy. More than a decade of conflict left Nepal with a weak government structure in remote areas, where even now there are no elected local governments and local councils. The more remote a district, the more likely the position is vacant with, at best, an acting official.



Investments in livestock are a common priority to increase capital for women in Nepal.

Meanwhile, communities keep their development process alive, try to overcome their challenges, and take advantage of the opportunities as they appear. In Nepal, community organizations have a long history of effective administration, and they function as a support mechanism for rural populations where the government is absent or weak. Public goods managed by communities are recorded by the community organizations and registered in local government plans.

Furthermore, community organizations in the country have taken a lead role in building resilience to external shocks, with strategies that allow them to direct their own development path within their own limitations. Communities have been investing in a comprehensive multisectoral strategy and therefore a longer-term solution. Not surprisingly, food-insecure areas invest heavily in increased food production and access to markets, by their own preference. The approach used by the Bank's program of support is to build on these community preferences and ability to work together.

*Lesson 3: Be alert to opportunities to develop markets that have a large unattended demand—such as fertilizer and seeds.*

Take advantage of the opportunity to address supply constraints, which may have a greater impact than just on your immediate objective. The food-security crisis strategy in Nepal includes the production of quality seeds as well as the transportation of fertilizer and seeds in the most food-insecure districts. The government of Nepal has put into operation a program to supply chemical and organic fertilizers and improved seeds at subsidized prices to farmers in remote areas (mountains and hills), where the cost of transport adds significantly to the cost of these inputs to the farmer. The food crisis response includes subsidized targeted transportation costs of these inputs from road head to the district headquarters and establishes several distribution centers within a district,

which means the farmers don't have to travel as far to transport the inputs to their farms.

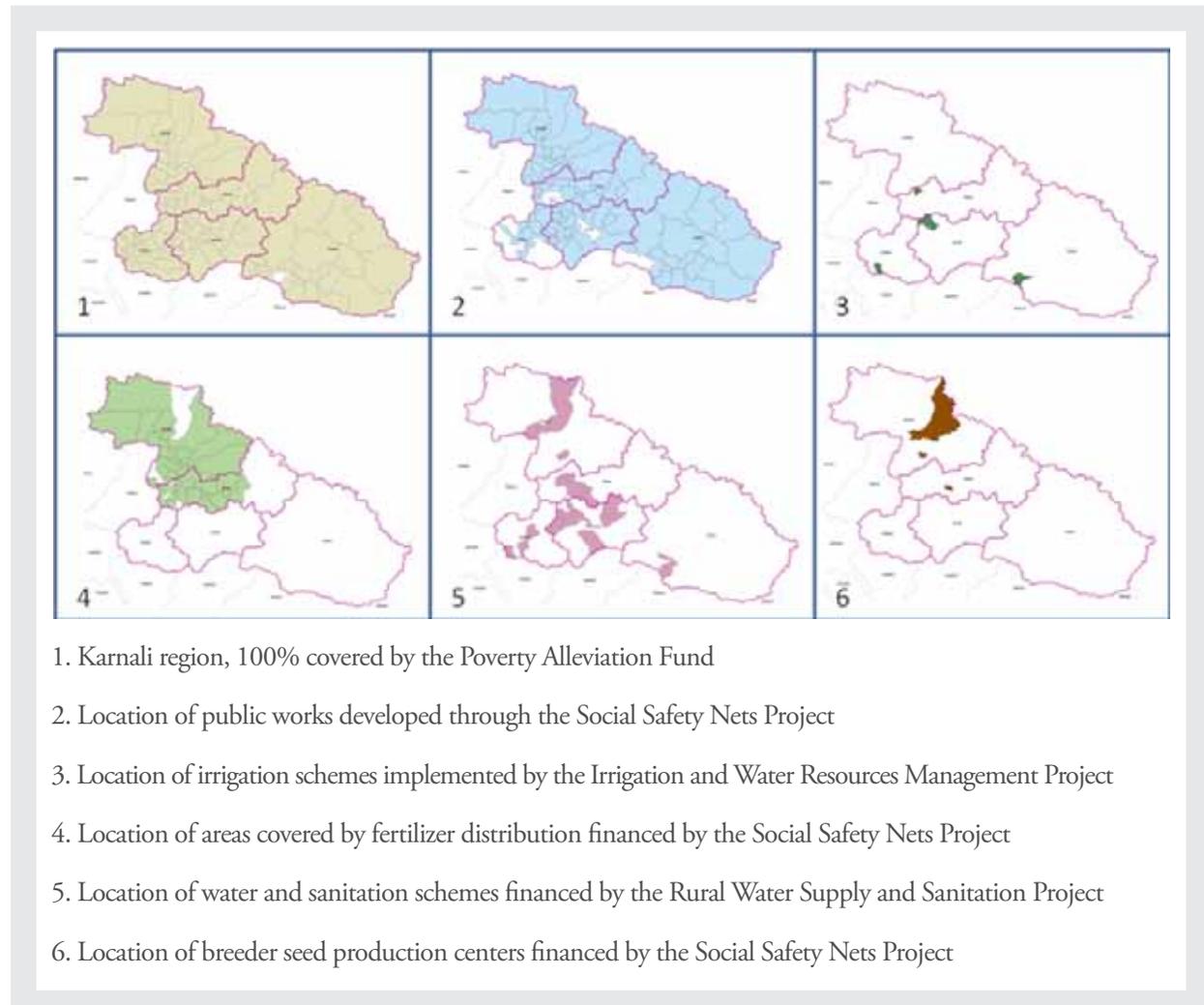
Also, invest in the development of quality agricultural input markets. Although fertilizer supply constraints are often difficult to address in the national context and may require solutions at the regional level, this is not the case with source seeds. It is possible to address improved provision of good-quality source seeds to increase productivity within a small country such as Nepal. The food response strategy involves financing the production, processing, quality assurance, bagging, and storage of pure breeder and foundation seeds for further multiplication of varieties with better nutritional qualities, which can partially offset the impact of climate change in food-insecure areas in the country.

The seed sector is also particularly attractive for private sector investments. Market development of agricultural inputs, especially quality seeds with characteristics that adapt to specific environments and climate change, is critical to sustaining and increasing agricultural productivity and can help motivate private sector investments. An increased perception that quality breeder seeds are becoming available is already resulting in interest from seed companies to increase investments in this sector.

*Lesson 4: Map it, show it, and perform—make information a tool for planning.*

Data can be overwhelming. Fortunately, advances in visual data analysis make it easier to detect outliers, carry out analysis, and provide guided analytics to project teams, government, and the general public. Displaying spatial information provides a platform for project developers to identify gaps and opportunities. Showing layered spatial data of different projects, indicators, infrastructure, and natural resources is useful for visual data analysis. It also has proven to be a good way to communicate complex databases that frequently are not interconnected.

Figure 1: Map of Community-Targeted Interventions Addressing Food Insecurity in Nepal



Furthermore, providing open access to this information improves transparency and accountability, and it enables strategic coordination between local and central authorities and the civil society. Figure 1 provides an example of how data visualization software can be helpful in detecting outliers. The map shows the Karnali region, the most food-insecure region in Nepal. In layers, it shows the location of four different community-targeted projects that address food security in the country. The map allows a quick view of the data, using color to highlight interventions in clusters of

villages. The map has been used to address coordination between projects and absence of interventions in certain areas where vulnerable populations live, to promote discussions, and to encourage the implementation of more appropriate strategies.

## CONCLUSION

Initially conceived as an emergency response, the Nepal Food Crisis Response Program used the crisis as a way to increase awareness that investments in

agriculture and safety nets are highly necessary in the country. A food strategy embedded in a longer-term poverty-alleviation strategy has the potential to create assets that translate into returns in the short, medium, and long terms for vulnerable populations. It also has the potential to involve private sector investors, who might see it as an opportunity to address a demand that has been unattended. A long-term poverty-alleviation strategy increases government ownership, improves aid effectiveness, and enhances community participation in local investments.

Challenges remain in realizing the full value of these necessary inroads, but the program has successfully generated a conversation about the cost of short-term emergency responses, the value of longer-term livelihoods programs that build on community strength, the opportunities to find sustainable solutions to productivity constraints, and the power of information to produce informed decisions that make the best use of scarce financial resources.

## ABOUT THE AUTHORS

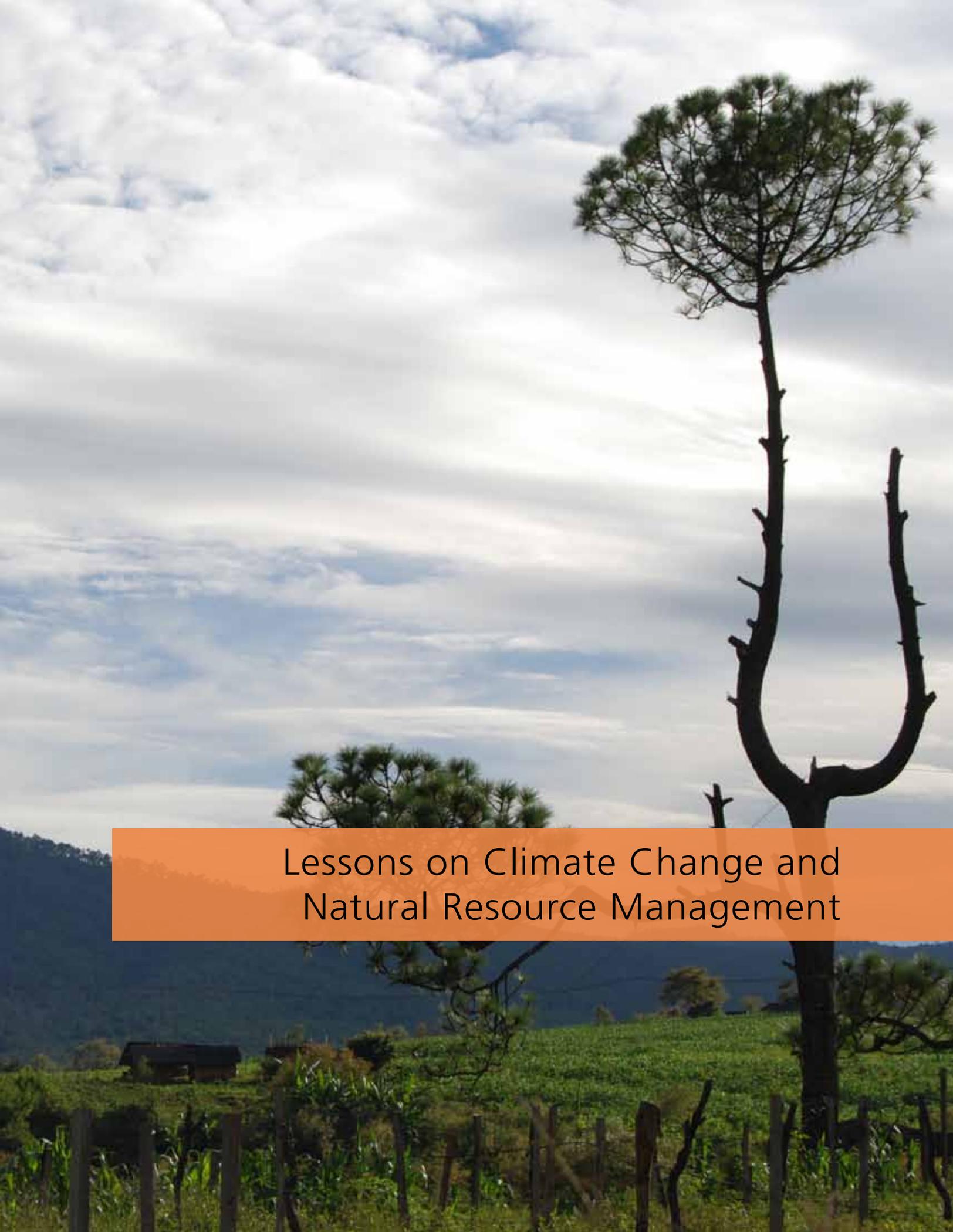
Gayatri Acharya, Senior Economist and Country Sector Coordinator, Agriculture and Rural Development in Nepal, has worked with the World Bank for the last 12 years on rural development, agriculture, environment, and social development.

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Approved by Simeon Ehui, Sector Leader, South Asia Agriculture and Rural Development (SASDA).



The food-security-focused poverty-alleviation strategy has resulted in more cultivated areas for the most insecure. Shown here is a proud beneficiary of the Poverty Alleviation Fund.



Lessons on Climate Change and  
Natural Resource Management

# Adapting to Climate Change in Bangladesh: Stress-Tolerant Seeds for Stress-Prone Regions

*In the event of global climate change, agriculture will be one of the worst-hit sectors in Bangladesh. Increasing global temperatures, rising sea levels, and melting polar ice caps result in land submergence, salinity intrusion, drought, and so on. All of these occurrences drastically affect agricultural productivity and, by extension, food security as well as the livelihoods of millions of people. Bangladesh, a low-lying deltaic country, is predicted by the international community of experts to be one of the first countries affected, and it has already been experiencing serious impacts of climate change, particularly in the agriculture sector. The Agribusiness Advisory team in Bangladesh has been working on a project focused on climate change adaptation and building resilience of the resource-poor farmers. This SmartLesson describes the team's experience.*

## BACKGROUND

Since Bangladesh is only 10 meters above sea level, it faces the risk of losing 17 percent of its land mass and the displacement of 20 million people as a result of a rise in sea level. Agriculture is the major economic driver in Bangladesh, accounting for 20 percent of gross domestic product (GDP) and 65 percent of the labor force. Of the total 9 million hectares of arable land, over 50 percent have already been affected by salinity intrusion, submergence, or drought. Crop yields have dropped to as low as 1.0 metric ton per hectare in affected areas (the average yield being 4.5 metric tons per hectare).

Between 1991 and 2000, 93 major disasters were recorded, resulting in nearly 200,000 deaths and causing \$5.9 billion in damage, with severe losses in agriculture. Cyclonic storms and tidal surges in the Bay of Bengal have become more frequent and intense. Changes in rainfall patterns are adversely affecting the

crop cycles, bringing new challenges to sustainable agriculture. For example, rising salinity levels in the coastal regions have made the traditional seed varieties redundant, and a belated monsoon brings forth a cascading negative effect on the subsequent production cycles. An increase in rainfall intensity and the occurrence of flash floods and tidal floods have made farmers even more vulnerable.

Added to this is the disproportionate growth of population (1.50 percent per year) and loss of arable land (1.75 percent per year). By 2025, an additional 19 million mouths are to be fed by a relatively poorly performing agriculture sector. Failing to take timely and appropriate adaptive measures and to build the coping capacity may result in catastrophic consequences with regard to food security and livelihoods for a growing population vulnerable to the impacts of climate change.

## THE PROJECT

To address some of these constraints and challenges, IFC is working with leading seed companies to increase the production, distribution, and adoption of stress-tolerant seed varieties, and to promote these varieties to farmers who desperately need them but are not aware of their availability or the farming practices the new seeds require. These seed varieties can withstand prolonged periods of submergence, high levels of salinity, and drought conditions. The use of stress-tolerant seeds has demonstrated a drastic reduction in crop damage in affected regions. Yields have been found to be as high as 5–7 metric tons per hectare in many regions. Development and promotion of stress-tolerant seeds, and the establishment of an efficient distribution system, are elements of one of the effective interventions for climate change adaptation in the agriculture sector, thereby contributing to food security and to the building of farmers' economic resilience.

Notwithstanding the importance of climate change issues in the arena of global development these days, there are few projects worldwide that address climate change adaptation—particularly with a focus on mobilizing private sector capacity and resources to meet the adaptation challenges. Thus there is limited opportunity to build on past initiatives. Each of the affected countries is setting its own objectives and identifying approaches to deal with its own specific constraints in adapting to climate change.

When the Agribusiness team of Bangladesh started evaluating the prospect of building adaptation projects around the use of stress-tolerant seed varieties, the importance and role of these varieties were not clear to many stakeholders. The release process of new seed varieties was slow. Policy was not favorable. The private sector had yet to see the business prospects. The public sector was slow and took a silo approach, relying mostly on the Bangladesh Agricultural

Development Corporation, the public sector agency responsible for supply of agri-inputs to farmers.

Thus, the team undertook stepwise initiatives to induct the relevant stakeholders, mobilize key partners, design specific projects, and ultimately roll projects out into the field. This led to the implementation of activities to strengthen the production, supply, and adoption of stress-tolerant varieties in the coastal belt of the country with four of the lead firms in the sector. During the first three months of the implementation activities, over 300 lead seed growers, dealers, and retailers were exposed to the varieties and their production process through field demonstrations. Training manuals on production of stress-tolerant varieties of rice have been developed to build the capacity of the contract-grower farmers and the technical team of the lead firms, to ensure that they meet the potential demand.

## LESSONS LEARNED

*Lesson 1: Work bottom-up to identify specific constraints.*

Climate change adaptation is truly a context-based need, even within a country. In Bangladesh, the southern coastal regions are suffering from salinity intrusion and submergence, while the northern region is suffering from water shortage and drought. Thus, the needs of the specific location, the current practices, and the capacity of the community to adapt have to be carefully considered in designing projects to suit the particular needs. For example, in Uganda, a development project distributed drought-tolerant seed varieties among farming communities and went back at the end of the crop season to check on the field performance of the varieties. The project team was shocked to see that there were no crops in the field. When asked why they had not planted the seeds they were given, the local people responded that they were suffering from the effects of a huge famine, and they ended up eating the seeds instead of planting them.

In our own context we first conducted a detailed sector study and baseline surveys to identify the critical constraints faced by the farmers. We then worked closely with government research and extension agencies to evaluate further results coming from the field and the resultant innovations that can address the constraints. This helped us understand the critical constraints being faced by the farmers, whether the stress-tolerant seed varieties would be beneficial to them, whether they would use them, what kind of pricing would make the product marketable, what the technical limitations of the farmers are with regard to using the varieties, what other input requirements there are (irrigation water, for example), what the production- and supply-related constraints are (from the perspective of the seed companies) to ensure a consistent supply of the varieties to the market, what the policy and regulatory issues are, and so on.

The project design then took all of these aspects into account.

### *Lesson 2: Effective stakeholder engagement: understand how critical the public sector role is.*

Agricultural research and extension in Bangladesh are still spearheaded by the public sector agencies. In our specific project context, the private sector entry into this business opportunity to meet the adaptation challenges was entirely dependent on access to breeder seeds of the stress-tolerant varieties from the Bangladesh Rice Research Institute for multiplication by the private seed companies. Further, collaboration with the Department of Agricultural Extension is critical for the private companies to leverage their extension networks in the market development of new products.

In one workshop, we were able to mobilize five directors general of relevant public sector agencies within the National Agricultural Research System, the top management of all leading seed companies, the sec-

retary of the Ministry of Agriculture, and the minister of agriculture herself. That was an exceptional event, where the public and private sector representatives jointly worked out their roles and responsibilities in promoting stress-tolerant rice in Bangladesh. Following the workshop, we formed a core group, with public and private sector representation, that provides an effective platform for us to interact with all stakeholders.

### *Lesson 3: Raise awareness at multiple levels.*

For new initiatives, it always helps to gain momentum around the focus area of the project. Several high-level workshops, seminars, and conferences highlighted the importance of stress-tolerant seed varieties in the context of Bangladesh. Diverse groups of stakeholders were introduced to the product and its importance. The initiatives provided multipronged benefits to the project. On one hand the private sector stakeholders started taking the issue seriously, and on the other hand it provided us access to all the key public institutions linked to the research, release, production, and supply of these varieties. These initiatives provided us, as champions of work in this field, smoother access to both groups, and helped us act as a catalyst in bringing them together into more collaborative initiatives. For example:

- The private sector needed to see the business aspect in the area of stress-tolerant seeds, and to make the extra effort to research and develop their capacities to produce, distribute, and supply the seeds to the farming community. We took this need into account for our promotional efforts that were focused on the private sector.
- To draw attention to the project, we engaged the big names in the private and public seed sectors. Their strategic engagement helped kick-start initiatives and gain support for the projects.

- A diverse and high-profile group was formed to lobby for the initiative. It included the director general of the Seed Wing, Ministry of Agriculture, the head of the International Rice Research Institute in Bangladesh, the chief scientific officer for Bangladesh Rice Research Institute, the president of the Bangladesh Seed Association, and seed experts. Their combined efforts led to the speedy release of two submergence-tolerant varieties that were in the pipeline.

*Lesson 4: It is important to catalyze other climate change initiatives.*

Compared with the compelling needs, we can directly address only certain constraints, but when interventions occur at multiple levels, we can begin to see strong positive impacts. For example, our efforts at enabling farmers to adopt stress-tolerant seed varieties might be impeded if the farming communities in the vulnerable regions do not have the basic level of protection, such as dikes and polders, to protect them from tidal surges. In many instances, either there are no dikes available, or the ones that do exist have not been maintained at all over the years, leading to collapse. Similarly, there are also issues related to social protection, public health, water sources, infrastructure, and so on.

IFC is working closely with the Pilot Program on Climate Resilience under the Multi Donor Trust Fund in Bangladesh to assist in the identification of such issues, and then building projects around them and mobilizing relevant stakeholders, so that the cumulative results in the area of climate change adaptation have greater impact and are more pronounced.

*Lesson 5: Deal with the constraints of resources and institutional capacity.*

Demands for work on the aspects of climate change have sprung up within a short span of time. The availability of skilled and experienced resources to assist on climate change projects and initiatives is limited. The few people who are available are being pulled in

10 different directions and are assisting in projects worldwide, often leading to diminishing quality of the service. Thus, it requires careful thought and investigation to identify resources to support the projects. Running the names of prospective resources through other donor-funded organizations helps gauge their level of engagement, intensity of assignments worldwide, and quality of service provided.

## CONCLUSION

The current project is a baby step in a long journey. So far, only one company has completed the first cycle of demonstration of a salinity-tolerant rice variety. Initial results show a smile on the farmer's face, but we need to gather more data on output at the farmer level to measure the results. Since varieties are new, farmers have yet to adopt and adapt to new practices. We all are going through a learning phase to see what works and what doesn't. The government recently released two new submergence-tolerant varieties, which has created more opportunities for the private sector—and for us as well—to scale up for a greater outreach and positive impact. The productive relationship we have been able to build with the private sector seed companies is the real strength for us, going forward.

### ABOUT THE AUTHORS:

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# Assessing the Carbon Benefits of Improved Land Management Technologies

*Ensuring food security under changing climate conditions is one of the major challenges of our era. Agriculture must not only become increasingly productive, but must also adapt to climate change while reducing greenhouse gas emissions. Soil carbon sequestration, the process by which atmospheric carbon dioxide is taken up by plants through photosynthesis and stored as carbon in biomass and soils, can support these goals. First, soil carbon enhances agricultural productivity, which reduces rural poverty; second, it limits greenhouse gas concentrations in the atmosphere; and third, it reduces the impact of climate change on agricultural ecosystems. This SmartLesson describes the potential benefits of selected land management technologies that sequester carbon.*

## BACKGROUND

Agriculture is the economic foundation of many developing countries, employing up to two-thirds of the workforce and contributing 10–30 percent of gross domestic product (GDP). For the poorest people, GDP growth originating in agriculture is about four times more effective in raising incomes than GDP growth originating from other sectors. Yet agricultural growth rates have declined significantly over the last decade, and food insecurity remains pervasive. Food production must increase by 70–100 percent by 2050 to meet the demands of a world with 9 billion people and changing diets.

Agriculture is highly vulnerable to climate change and needs to adapt to it. Under optimistic lower-end projections of temperature rise, climate change may reduce crop yields by 10–20 percent, whereas increased incidence of droughts and floods may lead to a sharp increase in prices of some of the main grain crops by the 2050s. While agriculture is the sector most susceptible to climate change, it is also a major cause of it, directly contributing about 14 percent of

greenhouse gas emissions, or approximately 30 percent when considering land-use change, including deforestation driven by agricultural expansion for food, fiber, and fuel. The net increase in agricultural land during the 1980s and 1990s was more than 100 million hectares across the tropics. About 55 percent of this new agricultural land came at the expense of intact forests, and another 28 percent came from the conversion of degraded forests.

With effective policies, agriculture can also be a part of the solution to climate change. Climate-smart agriculture (CSA) seeks to increase productivity in an environmentally and socially sustainable way, strengthen farmers' resilience in the face of climate change, and reduce agriculture's contribution to it by decreasing greenhouse gas emissions and increasing soil carbon storage. Historically, agricultural soils have lost more than 50 billion tons of carbon. Some of this carbon, however, can be recaptured through improved land management practices.

There is a growing global momentum to rapidly scale up CSA, but there is a more urgent need to improve

the knowledge base for facilitating investments in land management technologies that increase the storage of soil organic carbon. The Economic and Sector Work (ESW) on Soil Carbon Assessment was carried out to fulfill this need. The study involved:

- A meta-analysis to provide better estimates of soil carbon sequestration rates;
- An ecosystem simulation modeling technique to predict future carbon storage in global cropland soils; and
- An assessment of the cost-effectiveness of the land management technologies in mitigating climate change.

The ESW began in October 2010, and the results will be disseminated in January 2012.

## LESSONS LEARNED

### *Lesson 1: Soil carbon sequestration is profitable to the farmers.*

In addition to storing soil carbon, sustainable land management technologies can be beneficial to farmers, because they can increase yields and reduce production costs. Such technologies include integrated nutrient and water management, mulching and residue management, no-tillage, crop rotation, cover crops, and agroforestry—the integrated land use system combining trees and shrubs with crops or livestock. Increases in crop yields derive from the ability of the land management technologies to maintain soil organic matter and biological activity at levels suitable for soil fertility.

However, the pattern of increase in yield varies from crop to crop. The profitability of no-tillage systems derives primarily from a lesser labor requirement for seedbed preparation and other tillage operations as

compared with conventional tillage systems. In Zambia, yields have doubled for maize and increased 60 percent for cotton, compared with the conventional tillage system. Farmers also frequently reported significant crop-yield increases for maize, sorghum, millet, cotton, and groundnut in agroforestry systems, but relatively high labor inputs are required to reduce the competition effects of trees from having a negative impact on crop growth. Inorganic fertilizers also show relatively high profits, because they provide nutrients that can be readily absorbed by plants. They are less environmentally friendly, however, due to nitrous oxide emissions associated with high application rates of nitrogen fertilizers, and to fossil fuel-based emissions associated with fertilizer production and transportation.

### *Lesson 2: Soil carbon sequestration can be maximized by managing tradeoffs and synergies.*

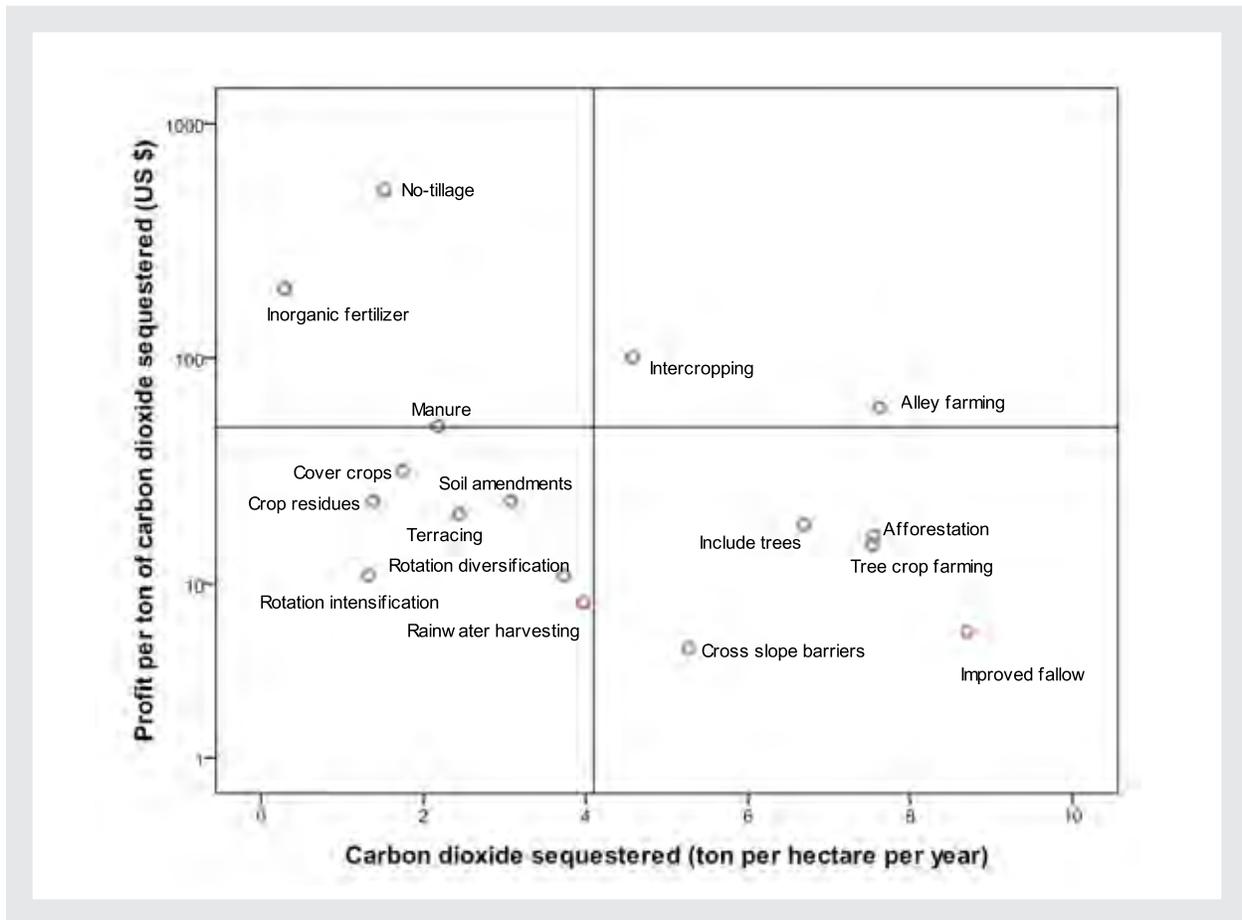
Tradeoff occurs when attempts to increase carbon storage reduce productivity (profitability). On the other hand, synergy implies a positive correlation between carbon sequestration and profitability. Increasing food security under a changing climate requires the analysis and identification of the land management technologies that maximize synergies and minimize tradeoffs.

Synergies between profitability and mitigation are found in two agroforestry systems: intercropping and alley farming (top right quadrant of Figure 1). Intercropping is growing crops near existing trees, whereas alley farming is growing crops simultaneously in alleys of perennial, preferably leguminous, trees or shrubs. Both are important strategies for increased productivity and resilience of the farming system.

Land management technologies in the lower right quadrant of Figure 1 have high mitigation potential but are modestly profitable. Afforestation, improved

Figure 1: Tradeoffs between profitability and carbon sequestration of sustainable land management technologies. Thresholds for classification were \$50 profit and 4.1 tonnes of sequestered carbon dioxide.

Note: Thresholds for classification were \$50 profit and 4.1 tonnes of sequestered carbon dioxide.



fallow involving the use of fast-growing trees to accelerate soil rehabilitation (including trees in croplands), and establishment of barriers across sloping areas tend to take land out of production for a significant period of time. They reduce the amount of land available for cultivation in the short run but can lead to overall increases in productivity and stability in the long run. The time-averaged, aboveground biomass of crop residues and other technologies in the lower left quadrant of Figure 1 is relatively small, compared with that of agroforestry systems. Also, the biomass of

crop residues does not accumulate easily, resulting in lower mitigation benefits.

Judicious fertilizer application counters soil nutrient depletion, reduces deforestation and expansion of cultivation to marginal areas, and increases crop yields. Yields also increase with manure application and accumulation of soil carbon, but with patterns that depend on crop type. Manure is less profitable than inorganic fertilizer because of the labor costs associated with collecting and processing manure

(top left quadrant of Figure 1). Manure also has quite low nutrient content relative to inorganic fertilizers, so a large amount needs to be applied on relatively small fields. This explains why manure works well for small-scale intensive and high-value vegetable gardening. Manure systems are also associated with high methane emissions. The relatively high profitability of no-tillage derives primarily from the decrease in production costs after the establishment of the system.

*Lesson 3: Sustainable land management practices generate benefits to the farmers—but at varying costs to the public.*

Carbon sequestration provides private benefits to the farmers through enhancement of soil fertility that leads to increases in crop yields and more efficient production. However, other benefits, such as improved air quality, water quality, and biodiversity, are public goods that accrue to society but not to the farmers engaged in market transactions alone. Without government intervention, poor agricultural land management will intensify land degradation and contribute additional greenhouse gases in the atmosphere.

Public cost refers to government support toward the implementation of land management practices. This includes investments in seeds and seedlings, input

*Figure 2: Relationship between Private Benefits and Public Costs*

*Note: Thresholds for classification were \$50 profit and \$5.50 for public costs.*

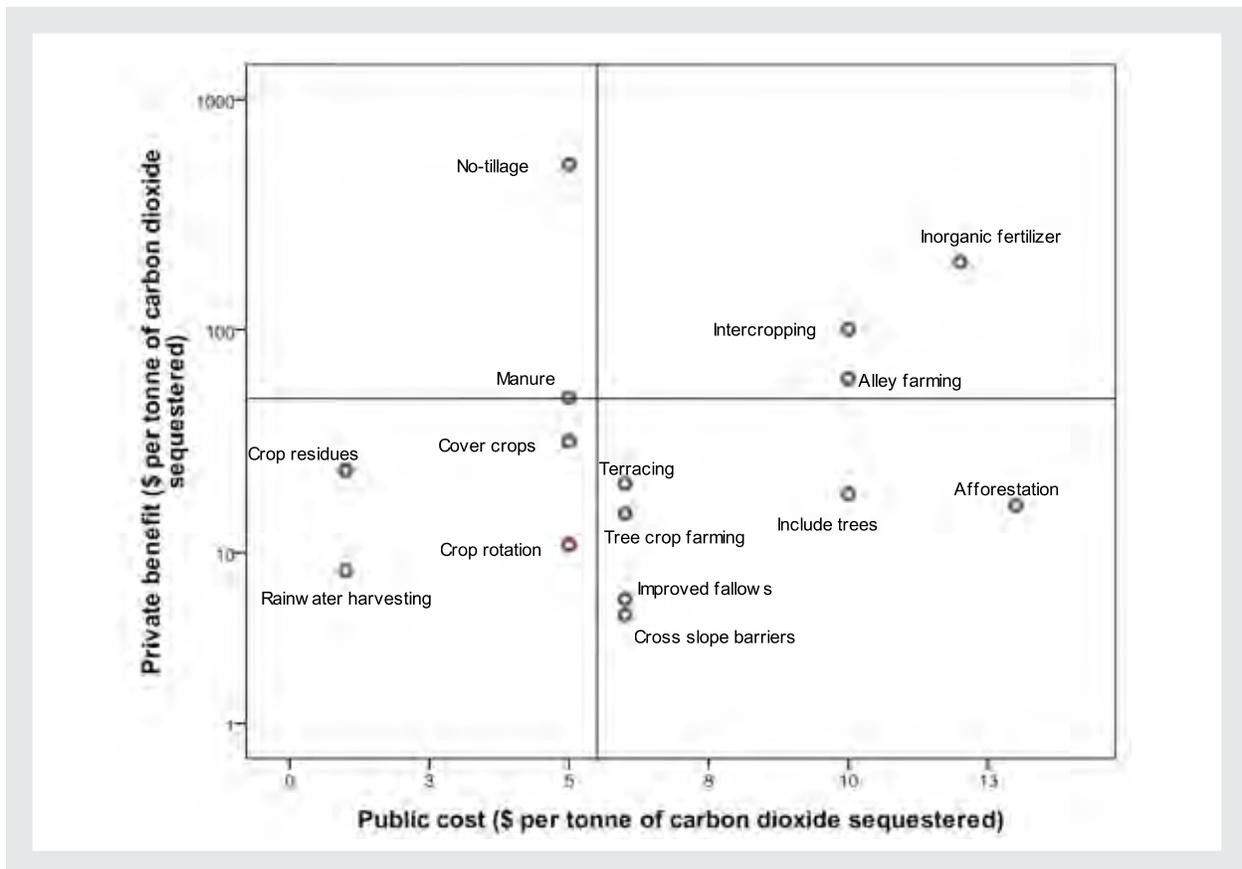


Table 1: Relative Importance of Different Factors for Adopting Improved Land Management Practices

Land management technology	Inputs/Credits	Market Access	Training/Education	Land Tenure	Research	Infrastructure
Inorganic fertilizer	***	**	**	**	*	**
Manure	**	**	*	**	*	**
Conservation agriculture	**	**	***	**	**	*
Rainwater harvesting	**	**	**	***	**	**
Cross-slope barriers	**	*	**	**	**	*
Improved fallows	**	*	*	***	**	*
Grazing management	***	***	**	***	**	*

Key: \* Low importance; \*\* Moderate importance; \*\*\* High importance.

Source: Synthesized from Liniger, H.P., R. Mekdaschi Studer, C. Hauert and M. Gurtner. 2011. *Sustainable Land Management in Practice - Guidelines and best practices for Sub Saharan Africa. World Overview of Conservation Approaches and Technologies (WOCAT) and Food and Agriculture Organization of the United Nations (FAO)*.

subsidies, extension services, and other administrative costs. The *pattern* of public support is as crucial as the *amount* of support for the full realization of productivity, mitigation, and adaptation benefits in agriculture. Public support measures that focus on research, investments in improved land management, and land tenure—rather than on input support—are generally more effective, benefit more farmers, and are more sustainable in the long run.

Technologies that involve significant change in land use (afforestation, improved fallows) and landscape alteration (terracing, cross-slope barriers) incur high public costs but generate low private benefits (lower right quadrant of Figure 2). The low profits suggest that farmers may be reluctant to privately invest in these technologies. Strong public involvement in these technologies is justifiable, given their relatively high mitigation potential. Crop residues, cover crops, crop rotation, and rainwater harvesting with lower

profits—and also manure and no-tillage that generate relatively higher profits—require minimal government support (lower left and upper left quadrants of Figure 2, respectively). These technologies generally have low mitigation potential. The relatively high public cost of inorganic fertilizer (top right quadrant, Figure 2) reflects the use of subsidies in spurring farmers' access to the technology.

*Lesson 4: Adoption of sustainable land management practices faces considerable barriers, despite the private benefits they generate.*

Despite the fact that improved land management technologies generate private benefits, their adoption faces many socioeconomic and institutional barriers. Table 1 suggests that lack of credit and inputs and land tenure problems are by far the most important factors for adoption. However, improved availability of inputs is a necessary but insufficient condition for

adoption of land management practices. Better market prices for crops and other agricultural produce are crucial. Secure land rights are a precondition for climate-smart agriculture, because they provide incentives for local communities to manage land more sustainably.

Behavioral change through education is required to enable changeover to improved land management technologies. For instance, conservation agriculture—the farming system involving no-tillage, residue management, and use of cover crops—is highly knowledge-intensive, requiring those promoting its adoption to acquire training and practical experience. Learning hubs, regional platforms, scientific research, South-South knowledge exchange, and technical support mechanisms will increase innovation and facilitate adoption of improved land management technologies. The knowledge base of land management practices at the local level can be also improved through careful targeting of capacity-development programs.

There is also the need to boost financial support for early action in climate-smart agriculture. For technologies with significant private returns, grant funding or loans may be more suitable to overcome adoption barriers. For technologies such as conservation agriculture that require specific machinery inputs, the initial costs of investment can be considerable. Thus, payment for ecosystem service plans could be used to support farmers and break the adoption barrier. There is also the potential for carbon finance to support farmers during the initial period before the trees in agroforestry systems generate an economic return. The costs to the public sector could be lower if some of the costs were borne by the private sector. For instance, the private sector may be involved in establishing tree plantations or in developing improved seeds and seedlings.

## CONCLUSION

We need a new global vision that appreciates and rewards the productivity, mitigation, and adaptation benefits of soil carbon sequestration. Progress in agriculture is slower than most people had hoped for under the UN Framework Convention on Climate Change (UNFCCC). However, some good news came out of the recently concluded Conference of Parties in Durban, South Africa, where, for the first time, it was agreed to initiate a formal work program under the UNFCCC Subsidiary Body for Scientific and Technological Advice<sup>18</sup>. Placing agriculture under a firm global agreement could help provide a policy framework for fully incorporating agriculture into adaptation and mitigation strategies. There is a need to integrate the public sources of climate finance and those supporting food security into a single mechanism to support climate-smart agriculture. Countries must be prepared to access new and additional finance. Readiness for carbon sequestration and climate-smart agriculture can be achieved through capacity building for strengthening the institutional and implementation framework for climate-smart agricultural development, and identifying early-action investments in land management technologies for different locales.

### ABOUT THE AUTHOR

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Approved by Mark Cackler, Manager, Agriculture and Rural Development Department of the World Bank.

<sup>18</sup> The Conference of Parties (COP 17) took place November 28 – December 9, 2011 in Durban, South Africa.

## The Fun and the Defiance of Innovation Going REDD+ in the Forests of Mexico

*By the end of 2010, the government of Mexico, through the Forestry Commission, requested support from the World Bank to develop and implement a new package of services (the Package) focused on forests and climate change. The Package was designed throughout 2011 to support sustainable management, restoration, and expansion of Mexico's forests, while promoting local socioeconomic development to strengthen local communities' resilience in the face of climate change and spearheading the global effort on Reducing Emissions from Deforestation and Forest Degradation (REDD+). This SmartLesson describes the challenges encountered in the design process of this innovative, integrated package of financial, advisory, and convening services.*

### BACKGROUND

Mexico has 64 million hectares of forests. About 70 percent of these belong to rural communities under a legally established collective ownership system—a tenure situation unique in the world. The net deforestation rate is moderate, but forest degradation is relatively high;<sup>19</sup> both show significant variation across the country.

It is estimated that 12–13 million people live in forest areas in Mexico. In the 1990s, the government of Mexico began empowering communities to manage their forest resources through a series of community-based incentives and advisory programs. Although much remains to be done, Mexico's approach to community forestry and payment for environmental services is now increasingly recognized as an emerging worldwide good practice. Many community forests are sustainably managed for timber and nontimber

products and services, and about 60 community forests are independently certified.

To address the challenges and opportunities in the forest sector, Mexico's Forestry Commission (CONAFOR in Spanish) was created in 2001. CONAFOR has the mandate to assist communities and small private owners in managing and protecting forests—for example, by developing management plans, restoring degraded areas, planting trees, using nontimber products, and protecting environmental services.

CONAFOR operates a range of thematic, community-based incentive programs, collectively known as *Pro-Árbol*. The scope of these programs has evolved rapidly since 2001, from traditional forest management to payment for environmental services and climate change mitigation and adaptation activities in the forest landscape. CONAFOR's budget increased from \$27 million in 2001 to \$486 million in 2011, and its portfolio has reached a total of about 12,000 transactions annually, benefiting about 4,000 communities.

<sup>19</sup> Government estimates for annual deforestation and forest degradation rates are 0.25 percent and 0.45 percent, respectively (based on the Readiness Preparation Proposal–CONAFOR 2011).

In parallel, Mexico has actively engaged in the forests and climate change dialogue at the international level, and has started to look at the opportunities for climate change mitigation and adaptation in conjunction with a sustainable rural development strategy.

After the success in brokering a set of decisions called the Cancun agreement to move international action on climate change during the 2010 United Nations Climate Change Conference in Mexico, the government of Mexico intensified its participation in

*Table 1: Instruments Included in the Forests and Climate Change Package*

Instrument	Description
<b>Forests and Climate Change Forest Investment Program (FIP)</b>	The FIP is a program of the Climate Investment Funds to support developing countries' efforts on REDD+ and promote sustainable forest management. Mexico is one of eight pilot countries worldwide. FIP resources under CONAFOR's responsibility (\$42 million) would be combined with the proposed IBRD SIL. <b>Status:</b> Approved by the board in January 2012 jointly with SIL.
<b>Forests and Climate Change Sector Investment Loan (SIL)</b>	The SIL will support the government of Mexico in two main areas; 1) Multi-Scale Institutional Strengthening, and 2) Incentive Programs to Communities. Tentative amount: \$300 million to \$350 million. <b>Status:</b> Approved by the board in January 2012 jointly with SIL.
<b>Social Resilience and Climate Change Development Policy Loan (DPL)</b>	Forestry is one of three pillars in the Social Resilience and Climate Change DPL (\$300 million). The pillar supports three policy actions: 1) launching of a new collaboration among CONAFOR and the Ministries of Agriculture and Environment; 2) creation of one national and three state-level REDD+ civil society Consultative Groups; and 3) inclusion of REDD+ in the first intermunicipal initiative. The same policy matrix is also supported by the French Development Agency with a budget support of €300 million. <b>Status:</b> Negotiated in January 2012. Expected board presentation March 2012.
<b>Forest Carbon Partnership Facility (FCPF)</b>	Mexico is eligible for a \$3.6 million grant from the FCPF for Readiness Preparation (studies and consultations). The activities would culminate in a Readiness Package consisting of: 1) a national REDD+ strategy; 2) a national forest reference level; 3) a forest monitoring and verification system; and 4) a system for addressing environmental and social safeguards. The FCPF also operates a Carbon Fund to pay pilot countries for demonstrable results in REDD+. Mexico intends to submit a proposal for pipeline entry in the Carbon Fund; envisaged transactions could be \$40 million per pilot country. <b>Status:</b> FCPF Preparation Grant Agreement ready for signing.
<b>Program on Forests (PROFOR)</b>	The Bank mobilized three PROFOR grants to support CONAFOR in: 1) redesigning the Mexican Forest Fund (\$100,000); 2) assessing Mexico's community forestry enterprises' competitiveness in local and global markets (\$150,000); and 3) conducting a South-South collaboration on REDD+ and Payments for Environmental Services with Costa Rica and Ecuador (\$150,000).
<b>Forest Bond</b>	The government of Mexico is currently exploring the possibility of piloting a Forest Bond with the Bank's Treasury Department.
<b>Global Environmental Facility (GEF)</b>	The objective of the Sustainable Production Systems and Biodiversity project is to conserve and protect nationally and globally significant biodiversity in Mexico through improving sustainable management practices in the productive landscape in priority ecological corridors. The Global Environmental Facility funds are \$11.7 million. <b>Status:</b> Expected board presentation April 2012.

the Forest Carbon Partnership Facility (FCPF)—a 50-country partnership for REDD+ administered by the Bank—and became one of the pilot countries for the new Forest Investment Program (FIP)—a targeted program of the Strategic Climate Fund. Simultaneously, the government expressed interest in engaging with the World Bank in the development of an integral Package of financial, knowledge, and coordination services to **support its forest agenda while promoting local socioeconomic development, strengthening local communities’ resilience to climate change, and spearheading the global effort on REDD+ (see Table 1).**

The main umbrella of this Package is composed of an IBRD Sector Investment Loan (SIL) providing a foundation for the country’s participation in the innovative Forest Carbon Partnership Facility and Forest Investment Program.

This Package has been recognized as an early example of the Bank’s enhanced business model in Mexico, combining investments, advisory, and convening services with new financial instruments and a focus on innovation. The government of Mexico considers it a core element of its climate change adaptation and mitigation agenda.

However, the innovative nature of the approach encountered some challenges during design, mainly because:

- Mexico is a sophisticated client and therefore needs sophisticated development solutions, not just traditional projects.
- Some of the instruments included in the Package are new, and Mexico is one of the first pilot countries to experiment with them and to deal with the new rules and procedures.

## LESSONS LEARNED

*Lesson 1: Birds of a feather flock together: mix and match instruments to increase the impact.*

*The successful design formula simultaneously combined financial services, knowledge services, and coordination and convening services. These instruments complement each other, add value, and scale the impact.*

Mexico requested that the \$42 million Forest Investment Program under CONAFOR’s responsibility be combined with the \$350 million Sector Investment Loan to increase the expected impact, simplify the design process, and reduce transaction costs. The SIL, the FIP, and the FCPF are designed in a manner that allows a two-way iterative process of learning by doing, where successful pilots from the FIP can be scaled up through the SIL while also informing the policy design supported under the FCPF, and vice versa. The Package is also coordinated and designed simultaneously with a development policy loan (DPL) for Social Resilience and Climate Change (see Table 1), providing political visibility and promoting important policy reforms needed to foster the SIL and FIP. At the same time, other innovative instruments (see Table 1 and Figure 1) support specific activities, such as South–South collaboration on REDD+, advice on the competitiveness of community enterprises, and the design of a potential forest bond with the Bank’s Treasury Department. The main focus was on designing an integrated *development solution*, instead of a traditional single project, with synergies that supported an exponential positive impact.

The Package reaches across sectors and ministerial boundaries in Mexico, and their proposed activities are organized at forest landscape level. Cross-sector collaborations involve government agencies in charge of environment, agriculture, biodiversity, indigenous issues, and gender, among others. Although the Forestry Commission will be implementing the Package, the cross-sector approach enables positive

environmental, social, and economic impacts. This approach could be used in the future as an example for the Global Landscape Restoration Initiative and “Climate-Smart Agriculture.”

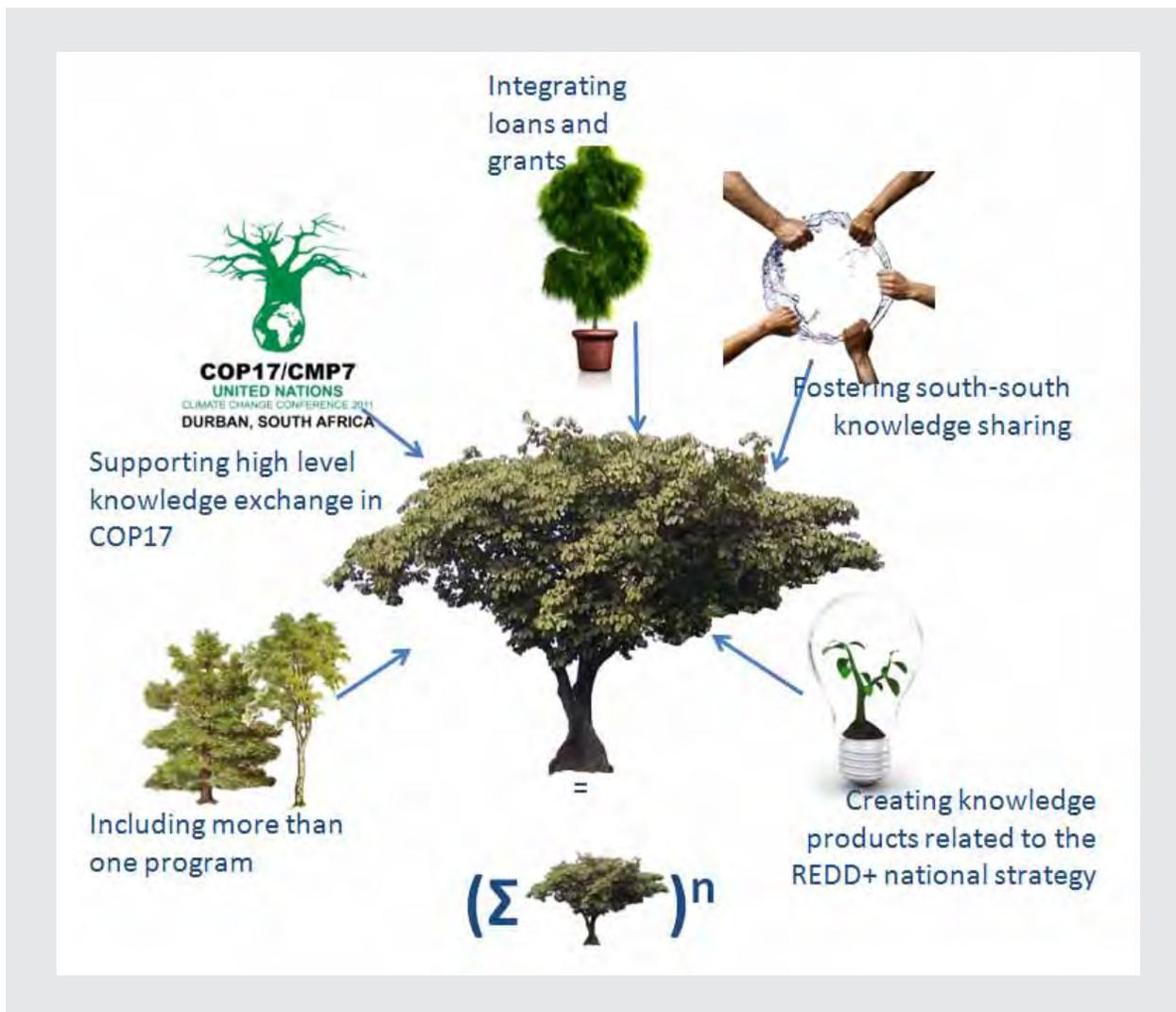
The packaging of multiple instruments has a multiplier impact, with a “developing solution” focus instead of a single product objective.

*Lesson 2: Do not start from scratch; scale up previous projects and complement the sector agenda.*

*When possible, use first-hand lessons learned, not just reports-based experiences. This will help to reduce risks and improve the project design.*

The design of the Forests and Climate Change Package was built on two decades of Bank operations

Figure 1: Packaging of Multiple Instruments



and policy dialogue on forests and climate change in Mexico and was fully aligned with the Bank's overall climate change engagement in Mexico (see Table 2). Most important, it capitalized on the strategies and instruments generated under three previous Bank-supported projects: Community Forestry, Community Conservation Project for Biodiversity, and Environmental Services Project. These operations

have succeeded in strengthening social and human capital and were used to spearhead the initial interventions and lay the groundwork for further investments and cutting-edge advisory and financial services.

Moreover, the Package has been coordinated and has used early experiences learned from the projects of other partners supporting the national Forests and Climate

*Table 2: Stages of Climate Change Engagement in Mexico, and Relationship with the Forests and Climate Change Package*

*Note: Forest-related operations are highlighted, and projects included in the Forests and Climate Change Package are underlined.*

Stages of Climate Change Engagement in Mexico				
	Foundations (Before 1999)	Early Support (1999–2007)	Strengthening (2007–2009)	Consolidation (2010–)
Knowledge Services		<ul style="list-style-type: none"> <li>LAC Region Landfill Gas Initiative (FY06)</li> <li>Evaluation of Energy Efficiency Initiatives (FY06)</li> <li>Economic Assessment of Policy Interventions in the Water Sector (FY06)</li> </ul>	<ul style="list-style-type: none"> <li><b>Carbon Finance Assistance Program for Mexico (FY09)</b></li> <li><b>Low-Carbon Study (FY09)</b></li> <li><b>Mass Urban Transport-Federal Program (FY09)</b></li> </ul>	<ul style="list-style-type: none"> <li>Social Impacts of Climate Change (FY11)</li> <li>MoU Subnational Climate Change (FY11)</li> <li>Othon P. Blanco Sustainable Development Strategy (FY11)</li> <li>Climate Change Public Expenditure Review (FY12)</li> <li><u>Forest Carbon Partnership Facility (FY11-13)</u></li> <li><u>Advisory Services under the Program on Forests (PROFOR) (FY11-on)</u></li> </ul>
Convening and Coordination Services		<ul style="list-style-type: none"> <li>Consolidation &amp; Strengthening of the Mexican Office for Greenhouse Gas Mitigation (FY99)</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of the CTF Investment Plan (FY09)</li> </ul>	<ul style="list-style-type: none"> <li>Energy-efficiency conference (FY10)</li> <li>Water sector events in the lead-up to COP16 (FY10)</li> <li><u>Agriculture and forestry sector events during COP16 and COP 17 (FY10-11)</u></li> <li><u>Forests and Climate Change Donor Coordination</u></li> </ul>
Financial Services	<ul style="list-style-type: none"> <li>Solid Waste Management Pilot Project (FY86)</li> <li>Urban Transport Project (FY87)</li> <li><b>Community Forestry (FY97)</b></li> </ul>	<ul style="list-style-type: none"> <li>Renewable Energy for Agriculture Project (FY99)</li> <li><b>Indigenous and Community Biodiversity Conservation Project COINBIO (FY01)</b></li> <li>Introduction to Climate-friendly Measures in Transport (FY03)   <b>Mexico Environmental Services Project (FY06)</b></li> <li><b>Programmatic Environment DPL I and II (FY06)</b></li> </ul>	<ul style="list-style-type: none"> <li>Climate Change DPL (FY08)</li> <li><b>Environmental Sustainability DPL (FY09)</b></li> <li><b>Sustainable Rural Development Grant (FY09)</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Green Growth DPL (FY10)</b></li> <li><b>Adaptation to Climate Change in the Water Sector DPL (FY10)</b></li> <li>Urban Transport Transformation Program (FY10)</li> <li>Adaptation to Climate Change Impacts in the Coastal Wetlands (FY11)</li> <li><u>Low-carbon DPL (FY11)</u></li> <li><u>Social Resilience to Climate Change DPL (FY12)</u></li> <li><u>Forest and Climate change SIL and FIP (FY12)</u></li> <li><u>Sustainable Production Systems and Biodiversity GEF (FY12)</u></li> <li><b>Ecosystems Adaptation DPL (FY13)</b></li> </ul>

*This table highlights several significant examples and does not aim to exhaustively illustrate all climate change activities.*

Change agenda, including a monitoring and verification system grant from the Norwegian Embassy and a €300 million budget support operation by the French Development Agency—which uses the same policy matrix as the Forest pillar of the Bank’s DPL. The Bank organized meetings with donors working on forest projects in Mexico to promote coordination and mutual learning. CONAFOR’s capacity to establish partnerships and trustworthy relations with many development agencies and experts around the world has been instrumental in building support for the proposed agenda.

*Lesson 3: Innovation is not is always simple: push the envelope, but understand the ground rules.*

*Innovation can have a high price. Work closely with the technical, safeguards, and fiduciary teams, and be as realistic as possible within your boundaries during technical design.*

As a pioneer in REDD+ instruments and global partnerships, Mexico has had the opportunity to innovate and guide the process. However, in some cases, the strategic thinking and technical design moved faster than the practical considerations. For example, when discussing implementation arrangements, we realized that the combined operation was not as simple as expected. Moreover, the rules and framework of the FCPF and FIP were still being developed—and were sometimes changing during project design—hence leading to the perception of a moving goalpost and requiring acrobatic explanations with the government and other stakeholders. Combining specific donor requirements with the Bank’s systems, while fostering client ownership and multi-stakeholder buy-in, was not always an easy proposition.

In spite of this bumpy road, the project kept its innovative nature and straightforwardness. However, clearer guidelines from the start could have saved multiple headaches.

*Lesson 4: Faster could be the antonym of easier: be sure to have a committed client and team when the time is short.*

*Keep the client and Bank teams fully committed. If the project is not a priority for both sides, it will be complicated to design it within a limited time frame.*

The client asked that the Package be designed in a short time frame. The design of the Package needed to be faster, but the safeguard, legal, and operational requirements needed to follow high standards, all the more considering the visibility and innovative nature of the operation. It took 12 months from identification to Board.

Having a motivated and committed client was a key element of success. The vision, technical skills, dedication, and flexibility of CONAFOR and the Ministry of Finance were outstanding. The Bank team, all quarters involved, also displayed tremendous energy and commitment. External and internal recognition of the Package as a milestone in the global climate change agenda boosted the client’s and the teams’ dedication.

One single team was in charge of the Package. It included staff from environmental, social, rural, safeguards, fiduciary, and communication units from the region and the anchor, with in-depth experience with Mexico’s institutions and field conditions and



Previous project demonstrated the value to a gender focus, which is retained in the SIL/FIP.

knowledge of previous Bank engagements. This team embodied a valuing of institutional memory while also bringing fresh views and experiences from other parts of the world.

*Lesson 5: Have more open dialogue and fewer brochures: involve communication strategies early when the project includes a new topic and vulnerable stakeholders.*

*Communication for development is more than words. Ensure that financial and human resources for communication are contemplated in innovative or sensitive projects.*

The Bank team included a communications officer throughout the design phase to ensure information dissemination. By assessing the needs and scope of the project—new topic, thousands of stakeholders with different interests, views, and even language—we saw clearly that we needed to use the principles of development communication to strive for multi-stakeholder participation, not just information dissemination, education, or awareness raising.

The team worked closely with the client, offering stakeholder workshops, training staff, and journalists, and giving advice to develop the national communications strategy for REDD+ and the overall Climate and Forests Package.

## CONCLUSION

In recent decades, Mexico has advanced in the design and consolidation of a variety of instruments related to forests and climate change. Since the 1990s, the Bank's engagement with Mexico in this area has been increasing, and the new Forests and Climate Change Package has the potential to become a milestone in this area and to be replicated in other countries.

The key early lessons from the design of Mexico's Forests and Climate Change Package could be relevant

when undertaking new collaborations with similarly sophisticated and demanding clients that are seeking development solutions beyond traditional projects. The lessons could also be useful in the design of complex operations that include various instruments and focus on piloting new approaches.

Though the design of the Package has been exciting, it also has come with challenges because of its innovative nature, the political time frame, and the complexity of handling multiple innovative instruments at the same time. The team always took these challenges as opportunities for creative thinking, while building on the solid foundations established over two decades of successful collaboration. As a result, as a well-informed external observer pointed out, the Forests and Climate Change collaboration with Mexico has the potential to become one of the Bank's most successful forestry programs anywhere ever.

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## More Than Just Hot Air: Carbon Market Access and Climate-Smart Agriculture for Smallholder Farmers

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*The Kenya Agricultural Carbon Project is breaking new ground in designing and implementing climate finance projects in the agriculture sector. The project is regarded as an innovative example for climate-smart agriculture within and outside the World Bank. For the first time, while increasing productivity and enhancing resilience in the face of climate change, smallholder farmers in Africa will receive payments for greenhouse gas mitigation based on sustainable agricultural land management. Quantification of carbon sequestration is monitored based on a newly developed carbon accounting methodology. This SmartLesson describes the key factors to consider when facilitating the adoption of climate-smart agricultural practices and access to carbon markets for smallholder farmers.*

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### BACKGROUND

The objective of the Kenya Agricultural Carbon Project is to increase crop yields and to enhance small farmers' ability to respond to climate change and weather variability. An additional benefit of adopting sustainable agricultural land management (SALM) practices is carbon sequestration, which leads to greenhouse gas mitigation. Smallholder farmers will be able to access carbon-credit markets and establish additional revenue streams by selling the carbon sequestered.

A Swedish nongovernmental organization (NGO), Vi Agroforestry (ViA), is implementing the project in collaboration with 60,000 smallholder farmers on approximately 45,000 hectares in western Kenya. The project is located on highly degraded land dominated by mixed cropping systems, mainly for subsistence farming. Average farm size is less than 1 hectare, and farmers have clear ownership rights to the land. Prior to the project, few improved agricultural practices

and technologies were used, and the resulting decline in soil fertility led to low crop yields.

The project developer provides advisory services that respond to the specific needs and questions of farmers. ViA extension staff are building capacity on a wide range of aspects of sustainable agricultural production, marketing, and development of farm enterprises. Farmers can choose which SALM practices that they would like to adopt, including mulching, composting, crop residue management, agroforestry systems, and manure management.

The NGO works with registered farmer groups based on contracts that detail the rights and obligations of both parties regarding service provision and carbon revenues. ViA sells the emission reductions to the BioCarbon Fund of the World Bank on behalf of the farmer groups. Once payments are made by the Bank (after project validation by an independent third party), almost all revenues will be used to benefit the

smallholder farmers, partly in the form of direct payments and partly through the financing of advisory services. Details of the terms and conditions of the sales of emission reductions are specified in the ERPA (Emission Reduction Purchase Agreement) between the Bio-Carbon Fund and ViA, signed in November 2010.

A key innovative element of the carbon finance project is the MRV (measurement, reporting, and verification) system to track the amount of emission reductions generated by the project. The NGO is implementing the MRV system, which is based on the first carbon accounting methodology for sustainable agricultural land management. Although scientifically rigorous, the methodology aims for cost-effective monitoring of emission reductions (ERs) to minimize the transaction costs and maximize the benefits for farmers.

## LESSONS LEARNED

*Lesson 1: Get the priorities right—focus project design on smallholder farmers' interests; first come increased crop yields and food security, and then carbon sequestration.*

Although the success of carbon finance operations is usually measured by the amount of ERs delivered, an agricultural carbon project should focus on increasing crop yields as a priority. Farmers will only adopt and maintain practices if they realize increases in productivity and incomes. The project team also should not attempt to convince the project developer and farmers to change priorities, since doing so would create false expectations about potential earnings from carbon revenues. Ex ante economic and financial analysis of the Kenya Agricultural Carbon Project clearly indicates that the amount of carbon revenues are expected to be small in comparison with revenues from increased crop yields. Farmers' primary objective is to achieve increased crop yields under changing climate conditions; they simultaneously provide an environmental service in the form of car-

bon sequestration. This environmental service should be rewarded, and carbon revenues can constitute an attractive co-benefit for smallholder farmers.

The amount of carbon revenues that a project could generate should be clearly communicated in the early stages. In the Kenya project, the Bank team communicated the level of expected carbon revenues right at the inception, and the project developer then communicated these aspects to the beneficiaries.

*Lesson 2: Monitor transaction cost—MRV systems should be cost-effective and user-friendly.*

Carbon payments are relatively small in comparison with the benefits of increased crop yields, particularly given the current prices paid for ERs from



A smallholder farm in East Africa.



A smallholder farmer and his family in East Africa.

agricultural land management. However, they can be an interesting additional incentive for the transition of agricultural production systems until higher productivity levels are reached and soil carbon pools are filled. Therefore, the transaction costs of the additional activities needed to sell the ERs, mainly the MRV system, need to be contained.

To the extent possible, a project should build on existing carbon accounting methodologies and integrate the MRV system into a project's existing monitoring and evaluation (M&E) system. In general, the project should build on the existing institutional structure of the project developer and avoid the creation of new structures for the carbon component only. Working with farmer groups instead of with individual farmers is essential to cost-efficiency.

*Lesson 3: Carefully select the project developer—strong extension systems, innovativeness, interest in learning, and technical and financial capacity are key.*

Agricultural carbon projects put high demand on the project developer, particularly since this approach is still in its infancy. A project developer needs to be innovative, flexible, and willing to spend sufficient resources on the complex technical nature of carbon finance operations. The entity should be interested in learning those aspects thoroughly, in particular how to make them operational. Requirements for project approval and verification of ERs under the existing frameworks can entail a rather long process. The project developer and farmers need adequate time to become familiar with the concept and the implications of participating in a project of this nature. The project developer should be made aware of those implications from the very beginning.

Currently, the Bank limits its support of carbon finance operations to technical assistance and the purchase of ERs. This implies a need for strong finan-

cial support from other sources for implementing the project. Most important, however, the project developer should have a strong and demand-driven advisory system in place. Without a well-established advisory system, adoption and maintenance of practices leading to a sustainable increase of crop yields and carbon sequestration will not happen.

Therefore, selection of the project developer is of utmost importance. The Kenyan project included the following steps in selecting a project developer: 1) a prefeasibility assessment of the carbon sequestration potential in Kenya's agriculture sector; 2) a workshop, plus a public call for project ideas to identify technically sound and financially viable mitigation activities; and 3) an in-depth capacity assessment of short-listed project developers and their project ideas, plus coaching support to enable them to develop a realistic and high-quality proposal.

*Lesson 4: Technical assistance and capacity building are key to project success—providing smallholder farmers access to carbon revenues requires special technical expertise.*

The Bank task team should be ready to spend time and resources on digging into a new technical subject area. If one of the objectives is to actually facilitate the flow of carbon revenues to smallholder farmers, MRV issues need to be dealt with thoroughly. Technical expertise from outside the Bank should be tapped into, since the Bank does not have the human resources to address the issues in necessary depth. Therefore, additional financial resources need to be identified early on to provide first-class and practical implementation-focused technical assistance.

In this project, additional Trust Fund resources were mobilized. Another promising option—also for scaling up—is to link such activities with Bank-supported investment operations. Further, contract only those consultants who have actually worked on MRV issues

related to land management projects, ideally an agricultural carbon project. Otherwise, you risk supporting an academic exercise with no operational relevance to the project. At the same time, however, it is crucial that capacity for generating ERs for market access is transferred systematically to in-country institutions.

*Lesson 5: Focus on areas with high agricultural potential—carbon sequestration potential is higher in areas with high biomass growth.*

If the objective is to design a project that leads to actual carbon payments to farmers, it should focus on areas with high agricultural potential. The amount of emission reductions generated by a carbon finance project based on adoption of SALM practices is mainly determined by the actual biomass yield and how the residues are treated. Biomass yields increase with favorable agro-ecological conditions. Even though there is certainly huge potential for sustainable land management projects in less favorable con-

ditions (focusing primarily on adaptation, which can also lead to carbon sequestration), the number of generated ERs might not justify a carbon finance transaction.

## CONCLUSION

The ERPA of the Kenya Agricultural Carbon Project was signed in November 2010, and project validation is scheduled for the first half of 2012. Farmers have started to adopt SALM practices, and the MRV system is being implemented. The intensive preparation phase and the first year of implementation have provided important lessons that are broadly applicable, independent of region, country, or specifics of project design. Obviously, the more farmers included and the more diverse the farming systems, the more complex the technical dimension becomes. However, complexity should not be an excuse, given the importance of learning by doing and the need for exploring practices and solutions for climate-smart agriculture while



A smallholder farm in East Africa.

at the same time finding mechanisms for rewarding small-scale farmers for the provision of environmental services.

The SALM carbon accounting methodology—developed as part of the project—has been approved by the Verified Carbon Standard. The methodology is in the public domain and can be used for similar projects, thereby lowering transaction costs significantly. More technical work needs to be undertaken and innovative approaches explored to further reduce transaction costs for MRV (without compromising on the accuracy of the system).

We also need to connect the dots for more effective work in the field. The Kenya Agricultural Carbon Project is adding knowledge and evidence at different levels. It is being used as a good-practice example for capacity building of interested project developers in East Africa—an effort supported by the World Bank Institute. ViAgroforestry and the World Bank continually inform a wide range of interested stakeholders—including civil society organizations, government officials within and outside Kenya, national and international research organizations, private sector entities, and development partners—about the project concept and its progress. Public awareness raising and consultations are an important element of further scaling up climate-smart agriculture in Africa and other regions. The project also serves as the basis of technical assistance on Readiness for Climate-Smart Agriculture in Kenya, supported by the Danish Ministry of Foreign Affairs, which aims to mainstream climate change considerations in Kenya's agricultural development strategy and programs. Further, the project is informing the integration of climate-smart agriculture into the Comprehensive Africa Agriculture Development Program, with the potential of scaling up climate change aspects in investment plans and operations.

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ДОМАШНЯЯ  
КЛУБНИКА

КЛУБНИКА  
КРЫМ  
СОЧНАЯ, СЛАДКАЯ

Lessons on Value Chain

# GO LITE! Increasing Scale and Impact by Combining Diagnostics and Training

## Lessons from the Ukraine Food Safety Project

*The Ukraine Food Safety Project found that the typical way of providing firm-level assistance—conducting an in-depth diagnostic for companies in a pilot project, followed by an offer for assistance—was scaring off some potential clients with the seeming complexity of the task and cost. But by offering a “lighter,” less-intense approach at a cheaper price, we were able to reach more clients and have a greater impact. This SmartLesson shares some of what we learned.*

### BACKGROUND

The programmatic approach in IFC Advisory Services involves a combination of policy work, public awareness campaigns, and capacity building at the firm level. Typically, a project rolls out firm-level assistance by training local consultants, who in turn conduct diagnostic evaluations and train firms. These consultants might also be hired to provide in-depth advisory services for specially selected pilot clients.

Although a project may reach many firms with training, it is difficult to measure results. Meanwhile, pilot interventions are limited to a select number of larger players who can provide a demonstration effect. Is there a way to reach many companies while also measuring results?

The Ukraine Food Safety Project has found a formula that is effective for agribusiness projects and perhaps other sectors as well. The approach is simple: We combine three short assessments with complementary training, while also partnering with market movers who can help ensure implementation. As a result, we are able to accomplish the following:

- Demonstrate measurable results more quickly than we could by working with pilot companies alone;
- Build a strong consultant base that will ensure the sustainability of the product;
- Reach more clients with demonstrable results and impact.

This methodology can be replicated for just about any firm-level intervention in a variety of sectors. We also feel that this could be a good way to conduct scoping in countries where a standalone project is not necessary but where IFC can still play a role.

### LESSONS LEARNED

*Lesson 1: Using an incremental approach increases the chances that a company will engage IFC—and allows you to track results.*

Most advisory projects include some kind of diagnostics and training. Often the diagnostics are used to get a foot in the door, in hopes that the firm will decide to engage IFC for more in-depth work.

Table 1: Staged Approach

<b>Stage 1: Initial onsite assessment</b>	<b>Stage 2: Training</b>	<b>Stage 3: Onsite consultations</b>	<b>Stage 4: Final onsite assessment</b>
1 day	2 days	1 day	1 day

Sometimes the company is interested but ultimately chooses not to engage IFC because the cost and time required to make the recommended improvements are too overwhelming. As a result, IFC has invested its own resources and time in a potential project and has nothing to show for it. How can we increase the chances that the firm will continue working with us?

We found that, with those clients that are not ready to commit to a longer intervention, breaking down a typical diagnostic into short, focused assessments lasting no more than one day each is a more effective approach. That way, we can focus on a shorter list of requirements (which is more manageable to the client), we have a good baseline to start from, and there is a smaller, less overwhelming list of follow-up items.

We then follow up with a standardized training workshop for all companies participating in the program, followed by a one-day consulting visit about one month later—then a final assessment one month after that (see Table 1). Since all the onsite visits are scored, we can measure how much the companies improve from visit to visit. In our pilot program conducted in 2010, client companies’ scores improved on average from 49 percent in the baseline assessment to 93 percent in the final. Preliminary results from our impact survey also confirm that these clients were able to increase sales significantly to major purchasers—in some cases doubling sales—since clients were able to demonstrate that they had made progress on food safety. To keep the results as objective as possible, we

assigned a different consultant to perform the final assessment.

Combining diagnostics and training enabled us to measure the results of our work, and we developed a scoring system that allows for comparisons between companies. For example, the first module contains 51 requirements in the form of a checklist. Each requirement is rated from 1 (not fulfilled) to 4 (requirement fulfilled). During a visit, the consultant reviews scores with the client and provides suggestions for how to improve the score for the next assessment. We are then able to track the effectiveness of the training and consulting visits. Ultimately, we saw that scores consistently increased after each phase.

By offering a less-intense product and bunching the companies into groups for the training, we were able to keep costs down and offer discount pricing to our clients, thus providing a further incentive to participate. Our in-depth advisory package typically involves about 50 consulting days, plus considerable IFC supervision, and costs between \$20,000 and \$30,000—at least 50 percent of which must be covered by the company. This lighter program, by comparison, requires only three consulting days on site, a two-day training session, and minimal travel. In the pilot phase we offered a 50 percent subsidy to incentivize participation. Since the pilot phase completed last year, we have priced this package at market rates, with no subsidy, at about \$1,000 per company.

*Lesson 2: Don't "Go Lite" alone—when possible, adapt existing training materials from international associations.*

Normally in our in-depth pilot work, we help clients achieve an internationally recognized food safety certification. Many major retailers will work only with those suppliers that are certified according to international standards; achieving one of these standards makes business sense for our clients, since it helps increase their sales. Examples of commonly used best practices are Hazard Analysis and Critical Control Points (HACCP),<sup>20</sup> Good Manufacturing Practices (GMP), and Good Hygiene Practices (GHP). Implementing these systems helps companies ensure that the food they produce is safe for their customers, and it helps them achieve the international standards required by retailers.

In the past, however, helping a client achieve certification has been a lengthy process—taking one or two years. Recently, the Global Food Safety Initiative—a collaboration between experts, retailers, and food companies that attempts to harmonize international standards in food safety—developed a shorter, three-module approach to certification. We have begun using these materials and this approach in helping our clients meet international safety standards. Using existing content that has already been endorsed by market movers has helped us encourage more companies to start improving their food safety levels.

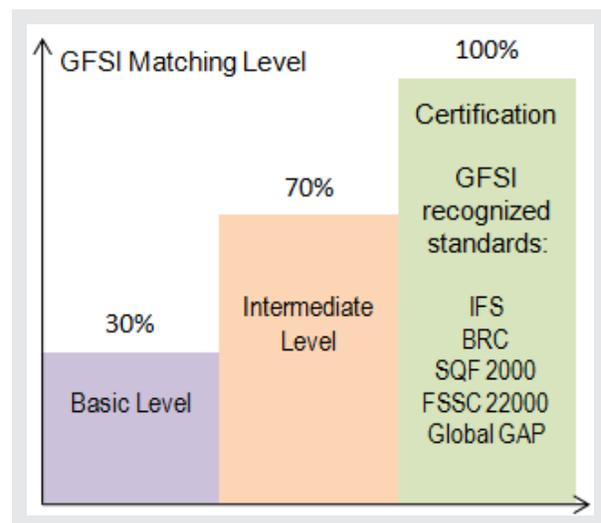
We now offer a standardized certification process, with group pricing, for the three levels developed by the GFSI (see Figure 1):

1. Basic Level—roughly corresponding to the prerequisites for HACCP, including GMPs, GHPs, control of allergens, and traceability.

<sup>20</sup> HACCP is an internationally accepted food safety management system that is required by many governments, including the European Union and the United States, for food processors. HACCP is a critical component of any international food safety certification plan.

2. Intermediate Level—includes HACCP as well as food defense, transport, and logistics.
3. Advanced Level (in development).

*Figure 1: Three Levels Developed by GFSI*



What's important here is not the topic (which could be food safety standards, farmer productivity, resource efficiency, corporate governance, or risk management); it's the approach. We took care to ensure that the assessments were focused enough to be conducted in *one day*, and the training was focused on this narrow list of requirements.

Companies that are not ready to commit to an in-depth advisory intervention now have the option of a less-intensive service that costs considerably less. Furthermore, because the modules are standardized and take less time, we can reach more companies. And because the content was prepared by GFSI, it already had the buy-in from a major market mover in our region: Metro Cash & Carry.

*Lesson 3: Engage market movers—they can provide incentives for companies to improve performance.*

Just as we engaged a global association to develop content for the training, it was also important to develop relationships with companies and policymakers that had the power to transform the market. In our case, we worked closely with Metro Cash & Carry Ukraine, a global retailer. Metro Ukraine signed purchasing agreements with its suppliers, stipulating that international food safety certification must be reached by 2013, and followed up with letters and presentations offering our program to its suppliers. So far, we have reached over 15 companies with the full program and hope to reach most of Metro Ukraine's 120 fresh suppliers in the next year. Metro Ukraine also provided the training space as an in-kind contribution, which has helped keep our training costs down.

Not only did Metro Ukraine provide incentives to join the program, they also followed up with clients that were not making sufficient progress. For example, one company was not demonstrating sufficient commitment to improving food safety at its factory—its scores, unlike all others in the pilot group, remained flat from Stage One (first assessment) to Stage Three (onsite consultation), with a below-average score of 39 percent. We were concerned and called Metro. Metro's meat buyer then called the client and threatened to take the company's product off the shelf for the lucrative holiday season. By the final assessment, the company had improved considerably and achieved a score of 92 percent! It continued to improve between the basic and intermediate modules and is now progressing well through the intermediate level. Sometimes only the market movers can provide the necessary wake-up calls.

However, to reach critical mass and achieve true market transformation, we recognize that a partnership with one market mover is not enough. We recently

launched a joint effort with the Ukraine State Committee for Veterinary & Phytosanitary Services, Ukraine's de facto food safety agency, to roll out the program. As with Metro, this partner will help push the suppliers to participate: we represent the carrot, while the government is the stick, threatening to revoke export or production permits if companies do not comply. We hope that we can get another major retailer on board to help us achieve even greater impact.

*Lesson 4: Encourage mentoring.*

From the start, we emphasized that this program, despite the short time frame, is about mentoring the companies, not auditing them. A train-the-trainer workshop—a one-week training for the consultants, which included a practical site visit—emphasized not just the technical aspects of the program but also how to support the clients. Whereas assessments and audits usually work with a checklist as a starting point, an auditor only identifies where the company has not complied with the requirements, and offers no solutions for how to improve. During our assessments, the consultants provided concrete solutions for how to improve scores before the next visit. In addition, the training specifically addressed the same checklist. Because there were representatives from about 10 companies in each training, firms also had the opportunity to learn from each other.

We have been in a “continual improvement” mode from the beginning, offering practical exercises for subjects that are difficult or new for Ukrainian clients. For example, we were particularly worried that inexperience with traceability and allergens, two relatively new topics for Ukrainian food companies, would cause our companies to fail the program. Therefore, we added practical group exercises and tip sheets to the existing training. In the end, we had significant progress in these areas, especially with allergens—all companies scored 0 percent in the first assessments and 100 percent on the final assessments.

*Lesson 5: “Going Lite” helps build local capacity by providing real-life experience in a controlled environment.*

The program is a great testing ground for our consultants. We have found that the pool of consultants for our in-depth interventions is now larger and more experienced. We are more comfortable working with consultants after testing them in this lighter-touch program.

But we made a mistake by paying a flat rate to all consultants, regardless of their going rates. In the beginning, we feared that the paperwork would be overwhelming and thought it would be easier to pay a flat rate. In the long run, this approach made things more complicated; one excellent firm did not want to work with us, since the rate fell below its normal rate, while less experienced firms got paid the same amount as the average.

## CONCLUSION

Although we still offer in-depth advisory services to select companies, we are finding in the first 18 months of this incremental approach that limited engagement with clearly set milestones and deadlines forces companies to do more on their own. Consultants are available for three days on site, but otherwise have little time to offer customized advice. We originally expected that companies would lose momentum in the six months between the end of the pilot program and the start of the intermediate program. However, we found the opposite: companies continued to improve on their own *without* hand-holding from us or the consultants. We therefore believe this incremental approach could work not just in agribusiness but also for most advisory programs.

## ABOUT THE AUTHOR

Sarah Ockman is the Manager of the Ukraine Food Safety Project. Prior to the project launch in October 2009, Sarah worked as a consultant on IFC Access to Finance projects. In 2011, she presented the results of this lite-touch program at the GFSI Global Food Safety Conference in London and for the Japan Food Safety Day in Tokyo.

Approved by Patrick Luternauer, Regional Business Line Manager, Sustainable Business Advisory Services, IFC Europe and Central Asia.

# Keeping It Fresh! How New Packaging and Distribution Improved the Fruit and Vegetable Supply Chain in Ukraine

*IFC's Ukraine Fresh Project focused on improving the fresh fruit and vegetable supply chain as well as the quality of fruits and vegetables for both the fresh market and processing. Key areas addressed were packaging and logistics, which had evolved from the rough handling of produce—a practice adopted following Ukrainian independence 20 years ago—to packaging in cardboard boxes. To increase produce quality and supply chain efficiency, the project introduced the modern system of pooling, in which produce is packaged and distributed in special, reusable plastic crates (see Box 1). This SmartLesson discusses some of the lessons we learned in introducing the pooling system to Ukraine.*

## BACKGROUND

Ukraine is a major producer of fresh fruits and vegetables. The commercial market has been growing for 10 years, with growth in 2010 exceeding 35 percent in spite of the recent economic crisis. Most fruits and vegetables are sold in open markets, with no more than 15 percent currently sold in supermarkets. However, with the strong growth of modern retail chains in recent years—exceeding 50 percent annually before the 2008 financial crisis—sales of fresh produce are likely to shift to supermarkets.

The potential for further increases in the market for locally grown fruits and vegetables is strong. Currently, 59 percent of the fruits and 30 percent of the vegetables sold in supermarkets are imported. Most of this produce could be grown in Ukraine, which has excellent climate to support fruit and vegetable cultivation. Fruits and vegetables cultivated for domestic consumption should be competitive with imports: they are fresher, have lower transportation costs, and have the potential for superior quality.

### Box 1: Pooling

**Pooling refers to the practice of using reusable plastic crates to pack, store, and distribute goods. Pooling is particularly important in the supply chain and distribution of perishable products, such as fruit and vegetables. Once packed, produce remains in the crate from the point of departure to the destination at the shops where it will be sold. The plastic crates also serve as the display units in the shops. Empty crates are collected and reused.**

**The benefits are significant: more efficient transport, lower cost, reduced waste, less damage, and ultimately higher quality produce. This system also promotes energy efficiency and reduces greenhouse gas emissions. Pooling is widely used in developed countries and is now being introduced in the countries of the former Soviet Union.**

## PACKAGING AND DISTRIBUTION: A KEY SUCCESS FACTOR

One key to improving the competitiveness of Ukrainian fruits and vegetables is in packaging and distribution. Prior to the implementation of the Ukraine Fresh Project, most Ukrainian produce was packed in cardboard boxes, and the distribution chain was fragmented as a result of several stages of reloading along the supply chain. The project was designed to:

- Facilitate access to commercial markets for Ukrainian fruit and vegetable farmers by improving quality and logistics, with a projected increase in sales of \$30 million;
- Facilitate investments in the fresh supply chain storage and logistics, with a target to support investments by \$20 million.

The project worked with main retail chains, including Fozzy,<sup>21</sup> the largest retail chain in Ukraine and a leader in fruit and vegetable sales, and Evroterminal, a company based in the Odessa region that is planning for investment in its fruit and vegetable logistics operations. The work with Fozzy focused on the development of logistics and the internal cold-chain handling of fruit and vegetables. The overall goal was to increase sales by improving quality and reducing waste. The work with Evroterminal consisted primarily of providing advisory services to the company on how to improve the fruit and vegetable portion of the business.

As of June 30, 2011, project clients reported a combined cumulative increase of \$46 million in Ukrainian fruit and vegetable sales and \$36 million in investments—well above project targets.

<sup>21</sup> Fozzy, a locally owned retail company, employs more than 50,000 people and has a 10 percent share of the organized market as well as an annual turnover of \$2 billion.

## DEMONSTRATING BEST PRACTICES

In late 2006, IFC organized a study tour to Turkey for Ukrainian farmers and local fruit and vegetable traders to study modern packaging and distribution practices, among other things. The following year, an IFC project in the southern region of Nikolaev conducted a feasibility study of the potential market for pooling in Ukraine and presented research data to market participants. The study also included a five-year business plan of a pooling company, developed in cooperation with Schoeller Arca Systems, a leading global manufacturer of plastic packaging systems.



Pooling in practice.

When the findings and plans were presented to local retailers and representatives of European companies, they initially estimated that the market for pooling services in Ukraine would not develop for at least five years. As a follow-up, in the spring of 2008, IFC organized another study tour to Turkey for a group of representatives of the Ukrainian fruit and vegetable business to study the experience of using returnable crates in pooling systems.

The financial crisis in 2008–2009 led to an increase in the cost of cardboard boxes used by the fruit and vegetable industry of Ukraine for packaging and distribution. This in turn led to a renewed interest in pooling, and several wholesale operators returned to Turkey to carry out additional studies of the system during the spring of 2009. Pooling slowly began to develop in Ukraine. Schoeller Arca Systems also quickly responded to demand by organizing the production of plastic crates in the fall of 2009. From that fall to the summer of 2010, the Ukrainian company increased its volume up to one million cases, investing more than \$5 million.

Fozzy was the first company to adopt the pooling system for the packaging and distribution of fruit and vegetables in the country. By the end of 2010, pooling and the use of plastic crates had been fully implemented for Ukrainian produce, with encouraging results: efficiency in distribution was increased as well as quality of the produce. The company estimated that efficiency in transport increased by 20–30 percent (depending on the produce being transported) and losses decreased by about 15 percent. The increased efficiency in transport was as a result of improved capacity (crates/pallets), and the reduction in losses was a result of less handling and better packaging. The company estimated an annual savings of about 300,000–350,000 kilometers of truck travel to transport Ukrainian produce alone—also saving 400–500 tons of carbon dioxide emissions per year, as estimated by an IFC climate change expert. Fozzy

estimated the annual value of introducing the pooling system in its fruit and vegetable operation to be \$5 million. Based on the positive experiences from fruit and vegetables, the company also introduced pooling for other perishable products (milk, meat, bread), gaining an additional \$2 million.

For farmers, the value of using returnable crates and a pooling system is a reduction in damage and losses (the farmer is paid only for accepted produce) and a more effective logistics plan at the farm.

## LESSONS LEARNED

*Lesson 1: Seeing is believing, when it comes to overcoming the resistance to break from the usual practice.*

Ukrainian firms initially rejected the idea of adopting the pooling system, citing factors such as cost (it was too expensive) and timing (it was not the right time for the Ukrainian market). To overcome this resistance, the IFC project team organized a study tour to Turkey on the overall fruit and vegetable supply chain in 2006 for farmers and traders. This led to a second study tour in 2008 for retailers, focusing on logistics and distribution. As a result of the second tour, a number of perceptions changed. Once Ukrainian firms saw the benefits of the system—including hard figures that showed cost savings—they became enthusiastic about modernizing their packaging and distribution systems.

*Lesson 2: Localize to the context.*

Industry information and financial models provided much of the key data needed to demonstrate the value of pooling. It wasn't enough, however, to merely show data from Europe or Turkey. The financial models had to be localized to reflect Ukrainian conditions—for example, the size of Ukrainian farms and traders/dealers (there are some significantly larger fruit and vegetable farms as compared with those in Western Europe).

Reflecting local conditions enhanced credibility and had a greater impact on the study-tour participants. The high level of awareness of and access to quality industry information for IFC projects made it possible to conduct studies quickly, and it also made it possible to evaluate the effectiveness of similar projects in other regions.

### *Lesson 3: Select the best clients to generate more buy-in.*

This project relied on working with a selection of clients to demonstrate new ways of doing business to an entire sector. Therefore, selecting the best clients was extremely important. Some of the factors we looked at were: 1) reputation—we wanted to be sure that others would be looking at the results; 2) willingness to share their experience—the clients benefited by being early adopters of the new technology, but we wanted them to be willing to show the benefits of the new system; 3) scale—the operations of the client had to be big enough for results to be visible; and 4) technical capacity—the client had to have the resources to implement the technology and assume the corresponding risks.



## CONCLUSION

Having worked in the fruit and vegetable sector in Ukraine for 10 years, IFC's technical assistance projects gained comprehensive information and knowledge about the sector, sector stakeholders, and important issues and bottlenecks. This was of major importance in enabling the Fresh project to identify problems, find a good partner/client to support the implementation of development (in this case a pooling system), and actually get things done. Today, different companies in Ukraine are implementing improvements in the supply chain, copying the success of Fozzy and other stakeholders. The experiences underline again the importance of a strong understanding of the sector and the selection of good clients.

The fruit and vegetable industry is a very important part of the food supply in almost all countries where IFC works. The problems in Ukraine—the need for new and modern technologies and the large bottlenecks in the supply chain (storage, packaging, distribution)—are present in many other countries. Addressing these issues effectively requires a thorough understanding of the sector and the market in the relevant country. You have to do your homework: in Ukraine, we conducted many studies and constantly researched the issues. With this knowledge, the success we had in Ukraine can be replicated in other countries facing similar challenges.

## ABOUT THE AUTHORS

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# To WII or Not to WII? Practical Lessons from Implementing Weather Index Insurance for Agriculture

*Weather index insurance (WII) is a new product, and numerous pilots around the world have experimented with it. But despite the potential promise of the product, the results in the field have been mixed. The Agricultural Risk Management Team of the World Bank has written a guidance document that distills almost eight years of effort researching, developing, and implementing pilot projects for weather index insurance in developing countries. It analyzes the advantages, challenges, and implications of implementing weather index insurance programs. This SmartLesson summarizes the key messages of a recently released discussion paper from the Agriculture and Rural Development department, titled *Weather Index Insurance for Agriculture: Guidance Note for Practitioners*. It is a distillation of the findings of almost eight years of research and development work on the topic, and the major lessons are summarized below.*

## BACKGROUND

Weather index insurance aims to protect farmers against weather risks such as droughts and floods. An index-based weather insurance policy links possible insurance payouts with the weather requirements of the crop being insured; the insurer pays an indemnity whenever the realized value of the weather index meets a specified threshold. Whereas payouts in traditional insurance programs are pegged to actual crop damages, a farmer insured under a weather index insurance contract might receive a payout, for example, in the event of too little or too much rain. In this case, rainfall serves as a proxy for crop water need, which in turn is correlated with actual crop losses.

Some potential advantages of index insurance over traditional crop insurance include the elimination of field loss assessments, reduced information requirements and bureaucracy, greater transparency that facilitates reinsurance, and lower costs and greater affordability for farmers.

Insurance is generally the first thing that comes to mind for most people when they think of risk, yet it is important to understand that, in agriculture, risk management consists mainly of three types of activity:

- *Mitigation* covers a number of traditional activities. From irrigation to hybrid seeds, from vaccinations to pest control, many agricultural activities are really the application of risk management approaches.
- *Transfer* is the simple act of passing one's financial risk to a third party, who is prepared to accept it in exchange for a fee or premium for the service—as, for example, in insurance and commodity price hedging.
- *Coping* comes into play after the fact, when an individual takes *physical* or financial measures to deal with the impact of a risk once it is realized.

Before embarking on the use of a particular product, it is imperative to identify the risk and assess the potential application of one or a combination of these risk management activities, including insurance.

Since the late 1990s, there has been a lot of discussion and debate about the promise and potential uses of index-based insurance in agriculture in developing countries. A 2005 World Bank publication, *Managing Agricultural Production Risk*, set out in some detail the potential benefits of index insurance and some early examples of its application in developing countries. Since that time, a large amount of research and piloting of the product has been undertaken both within and outside of the World Bank, largely targeting small farmers. However, despite this experience and effort, there have been few examples of successful scale-up at the farmer level without the help of policy or financial tools by governments, heavy financial support from donors, or both.

## LESSONS LEARNED

*Lesson 1: Prefeasibility work is important, since data series may be incomplete or missing.*

The need for accurate and reliable data for the establishment of the index creates major challenges in many developing countries. For years there has been underinvestment in meteorological services and infrastructure in developing countries; as a result, data series are often simply not available. These data are necessary for the implementation of pilot programs, and practitioners should identify whether these are available at the outset of the activity. In certain cases there may be alternative solutions—for example, constructing synthetic weather data by interpolating field and satellite-based observations to create a higher resolution data grid.

## WII: ADVANTAGE AND RESULTS

### Claimed Advantages of WII

- Reduces adverse selection
- Reduces moral hazard
- Eliminates field loss assessment
- Simplifies information requirements for farmers
- Lowers administrative costs
- Facilitates reinsurance
- Increases Transparency

### WII Piloting Results

- Few examples of successful scale-up
- Not much clarity about the “successes” and “failures”
- Limited dialogue and information exchange on the topic
- Lack of technical guidance on when, why, and how to proceed with WII pilots
- Limited information on practical, technical, and operational challenges on implementing WII
- Lack of information on building blocks and necessary pre-requisites for launching WII programs

*Lesson 2: The implementation of index insurance plans is technically very challenging, and there is a lack of capacity in those countries where it would be most useful.*

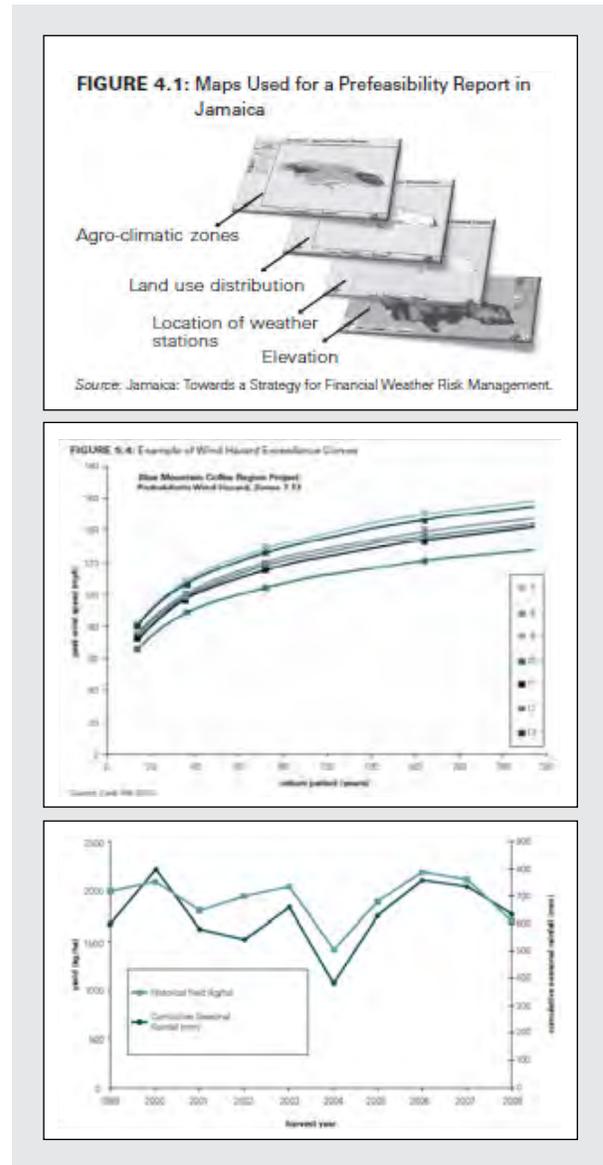
There is currently a lack of technical capacity in the insurance sectors of most developing countries, which is a constraint to the scaling up and further development of WII. Although it is possible, on a pilot basis, to use external consultants to design an index product and assist in rollout, marketing, and sales, such assistance is not possible on a wide scale, simply because of the lack of qualified professionals. It usually requires intricate mathematical modeling, data manipulation, and expertise in crop phenology (the study of how plant life relates to variations in the climate) to design an index.

Until such time as local capacity in these and other areas is developed, there will be a heavy reliance on scarcely available international technical assistance. The technical expertise required also makes the product expensive and difficult to market to potential policyholders.

*Lesson 3: Farmers actually want full indemnity. The very nature of an index-based product creates the chance that insured parties may not be paid when they suffer a loss.*

Index products do not offer exact indemnity—a farmer can suffer a loss and not receive a payout, either because the index was not triggered or because the loss was caused by a variable not covered by the index. This would be the case if, for example, a farmer had drought coverage and his crop was destroyed by a pest. Generally, farmers want indemnity from loss, no matter what the cause. It is possible to structure insurance with multiple indexes, but this increases the complexity of the product and makes it difficult for farmers to comprehend it.

### Sample Feasibility Assessment



“Basis risk” is also a particular problem for index products. It is frequently caused by the fact that measurements of a particular variable, such as rain, may differ at the insurer’s measurement site and on the farmer’s field. This also creates problems for insurance providers. Insurers face serious reputational problems when farmers pay premiums and suffer losses not cov-

ered under the index. Insurers run the risk that such incidents negatively affect other products that they sell in the market. Part of the reason the scaling up of index products has failed is that both insurers and farmers suffer from this basis risk.

*Lesson 4: There are practical challenges to product rollout and the establishment of a sustainable pilot, including the willingness of farmers to pay.*

The rollout of a product and its sale to potential policyholders can be very time consuming and complicated. In addition to all the technical challenges of establishing a weather index, it is not assured that farmers will be willing or able to pay premiums. Most farmers in developing countries have extremely low disposable incomes and a limited awareness of financial products such as insurance. Given this, most are reluctant to pay insurance premiums, because many do not monetize their crops—especially if their government has a history of writing off debts or providing compensation. Add to this the complexity of explaining how WII works and on what basis payouts are calculated, and it is clear that demand is a real obstacle to scaling up.

Even though WII may not require a local presence for field-level assessments, it does require local presence during product rollout and sales. Extensive awareness activities and training are necessary to ensure that farmers understand the product. The costs inherent in such a process are prohibitive for most local insurance companies and therefore a major constraint to product development. Likewise, banks and local partners may be hesitant to cooperate, and it may take a long time to market and sell the product to consumers in potentially remote farming communities.

*Lesson 5: Legal ambiguity will continue to threaten the use of WII.*

Bear in mind that *there is a lack of clarity as to the regulatory and legal status of index-based products in nearly all jurisdictions*. Clearly, index products do not align with the traditional definition of insurance, because they do not indemnify actual loss and policyholders do not need to have an insurable interest before they purchase an index-based contract. Certain commentators have referred to these products as little more than gaming or lottery-type activities. Without strict regulation, buyers of these products will not have their interests protected by law.

## CONCLUSION

Experience with the product has been mixed, but there appear to be some promising applications that can benefit farmers in developing countries. Some areas in which WII or other index-type products show promise include the following:

***For large-scale commercial farmers.*** For large-scale farmers who have clearly identifiable and insurable losses, and revenue streams that enable them to pay premiums, WII can be an interesting option, especially where traditional insurance is either not available or too expensive.

***As a financing tool for social protection plans.*** WII may not be for the “poorest of the poor” because of their inability to pay premiums or lack of insurable interests. But the use of indexes at a district, regional, or national level can be a useful tool to generate funds for social protection measures in natural disasters. Obviously, the issue of who will pay the premium and the establishment of distribution channels are important parts of the product design.

***Portfolio risk management for intermediaries.*** Input suppliers, banks, and processors often lend cash or products to a wide group of farmers and are

therefore exposed to the same production risks. The use of WII by such intermediary stakeholders can be effective in reducing their exposure to certain risks. However, care should be taken, because many risks that actually drive farmer default cannot be covered by WII—for example, side selling, price risk, and quality issues. In addition, there is a possibility that if a farmer is aware that the counterparty has insurance, the farmer will be more likely to default, even where default is not due to a risk covered by the index.

***Sovereign risk transfer at the macro level.*** If a country is running a contingent risk that relates to a weather variable, the use of a WII product can be extremely useful. Although at this level the product is slightly different—a derivative, as opposed to insurance—the general principles are the same. The payouts received from such a derivative could be used to stabilize budgetary shocks, purchase food for vulnerable populations, or finance social safety-net programs. Although this is a very attractive form of risk management, countries often cannot finance premiums, or they face political challenges in the use of public funds for nontangible and potentially “risky” premium payments.

***Contingent finance, as opposed to risk transfer.*** Very similar to the previous application, the use of parametrics related to contingent financing is another interesting use of the index model. However, in contingent financing, a country faces slightly less “risky” premium payments, which are replaced by much smaller commitment fees to access a line of credit, if needed. The main advantage for politicians is that they do not have to pay relatively large amounts of money and potentially receive nothing in return—with contingent finance, they have to pay back the credit used to compensate losses, but only if the risk is realized.

This SmartLesson describes lessons derived from a number of agricultural index-based weather insur-

ance pilot activities by the World Bank and its partners. It should be noted, however, that the field continues to develop, evolve, and benefit from innovations in many technical areas, with a number of new approaches being tested by other institutions. Weather index insurance faces many challenges, but if a number of obstacles are overcome, it might still hold some potential for risk transfer in the agriculture sector in developing countries.

## ABOUT THE AUTHORS

This SmartLesson was written by the Agricultural Risk Management Team of the Agriculture and Rural Development Department of the World Bank, under the leadership of Marc Sadler (Task Team Leader). The core team working on this document consisted of (at various times) Erin Bryla-Tressler, Joanna Syroka, Julie Dana, Ornsaran Pomme Manuamorn, Alex Lotsch, William Dick, Andrea Stoppa, Sandro Calmanti, Erik Chavez, Xavi Gine, Panos Varangis, Ulrich Hess, Steve Jaffee, Carlos Arce, Jerry Skees, Mario Miranda, Richard Carpenter, Olivier Mahul, Ramiro Itturioz, David Rohrbach, Diego Arias, John Nash, Hector Ibarra, Pablo Valdivia, Roy Parizat, and Vikas Choudhary.

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## Supporting Smallholders while Promoting Farmer-Controlled Cooperatives in China

*Farmer cooperatives in China have seen tremendous developments and increases in membership. But making them more beneficial for China's millions of smallholder farmers remains a challenge. Promoting farmer-controlled cooperatives within the existing institutional country context is a challenging and long-term agenda requiring a strong focus on the ultimate beneficiaries and engagement well beyond a single fiscal year, study, or project. Given the blockholder structure of many cooperatives, ensuring that smallholders benefit will be difficult—but not impossible. This SmartLesson suggests ways to promote the smallholder role in Chinese farmer cooperatives.*

### BACKGROUND

After more than a decade of internal debate by ministries and local authorities, the China Farmers Professional Cooperative Law (CFPCL) was passed in November 2006 and enacted in July 2007. With the passage of this legislation came a rapid growth in the number of farmer cooperatives. According to statistics from the official cooperative registrar office, the State Industry and Commercial Bureau, 407,600 farmer cooperatives with a combined membership of 7.8 million and equity capital of 502.4 million Chinese renminbi (approximately \$79 million) had registered by the end of March 2011.

Although the progress in numbers is impressive, a key issue for the development of cooperatives in China will be governance—or, in short, who owns and controls them. Various field studies suggest that most farmer cooperatives have a heterogeneous membership, and that the agricultural activities of members vary tremendously in type and scale. Large, wealthy households with significant economic and political influence in their village or township often exercise a dominant influence over cooperative decisions and can reap disproportionate benefits. Some are initiated

and controlled by nonfarmers, most commonly government officials or leading agribusiness enterprises.

Many others are organized through the “company and households” model, in which a leading company and other key shareholders, such as government officials, control the shares. Many local governments regard these mixed-membership cooperatives as a means to support their local economic champion, and these types of cooperative often receive significant support in the form of tax breaks and subsidized interest on loans or grants. They can be characterized by the following:

- **A “blockholder” governance structure.** The blockholder model tightly links ownership and control. Managers are supervised by a concentrated group of blockholders—individuals who own a large portion of the organization's shares. In the blockholder approach, large shareholder blocks are held by big businesses or controlled by families, ethnic networks, or authorities. The board of directors is made up of representatives from these various blockholders.

As blockholders, many big households exploit the cooperative to their own ends, and smaller produc-

ers remain peripheral members. Voting rights are in proportion to shares of equity contribution rather than “one member, one vote.” Small producers do not, or are not allowed to, contribute capital to the cooperative; as a result, many of these members become alienated from what should have been their own organization. This gives smallholders little or no influence on issues that should be of direct concern to them, such as the marketing and pricing of their products. The core members capture the lion’s share of surpluses of profits and capitalized government grants.

- **Exclusivity.** Small farmers are forced to operate under the umbrella of the cooperatives, because the leading enterprise will not deal with individual producers. This is because of its concern with food safety, compliance with government regulation, and the transaction costs of dealing with individual small producers.

- **Lack of bargaining power.** Smallholders are often the majority, but they have difficulty exerting bargaining power with the actors downstream of the supply chain. Given a cooperative’s relatively small scale of operation and inability to integrate forward along the supply chain, smallholders have to obey the terms of trade specified by these companies. In addition, core members of the cooperative often raise funds for project investments by recruiting new members, but they often refuse to grant voting rights to new members.

The resulting pattern of cooperative development has serious shortcomings but seems to be the outcome of China’s agricultural industrialization, given its economic development goals and political economy. However, farmer cooperatives are dynamic institutions. Development partners, including the World Bank, can play a crucial role in shaping these organizations to yield greater benefit and control for smallholder farmers.



Group meeting of vegetable growers in Sichuan.

## LESSONS LEARNED

*Lesson 1: Though the ultimate focus should be on smallholders and beneficiaries, pursue changes at the highest policy levels.*

The Bank's first support for introducing farmer organizations into China dates back to 1993 when, under the Agricultural Support Service Project, it promoted smallholder farmers' forming various types of producer organizations toward the goal of improving their competitiveness. The project financed several visits of groups of policymakers to study farmers associations and other self-help groups in Australia, the United States, and other countries. However, at that time, the Chinese government did not initiate reforms based on the experience gained.

But work continued. In 2006, the Bank undertook an Analytic and Advisory Activities (AAA) study—China Farmers Professional Association: Review and Policy Recommendations—in parallel with the legislative process of the CFPCL. The study engaged all key stakeholders, including the Ministry of Agriculture, the Development Research Center (DRC), leading research institutes, and local governments. It commissioned field studies to examine various pilot activities at the grassroots level and understand the pattern of producer groups.

The Bank also supported policy studies of government think tanks to review the practices of producer groups worldwide and develop policy recommendations to legislators. This included a discussion on internationally accepted principles for farmer cooperatives and their differences with other groups and business organizations. To this end, a number of international conferences sponsored by the Bank, the DRC, and the Canadian International Development Agency were conducted in Beijing. These studies and events have given Bank staff solid ground to argue for farmer cooperatives, and the ability to expose Chinese

counterparts to the most relevant experiences from around the world.

A policy study report summarizing key findings and policy recommendations was also widely disseminated to policymakers, legislators, and the development community in 2006. As a result, some of the Bank's key messages were ultimately incorporated into the CFPCL, including changes to ownership and benefit structure.

*Lesson 2: Ensuring that project benefits accrue to the intended beneficiary is often more difficult than it seems. Bank teams need to play a “balancing” role.*

Given the power structure in many rural communities, smallholders are often at the mercy of larger blockholders and influential government officials. Bank task teams need to provide accountability by pointing out these imbalances and other inconsistencies, with the objective of benefiting all cooperative members. This allows smallholder producers to benefit from project investments by participating in project activities.

Bank supervision missions have played a key “checks and balances” role—this has been crucial, because the intended beneficiaries are usually vulnerable, and other project partners do not always have sufficient capacity to carry out these initiatives. For example, under the Henan Ecological Livestock Project, the county project management offices usually report to county line bureaus, as is common to all projects in China. Often, bureau leaders intervene to select specific contractors; sometimes the ones they favor are too large and not eligible for participation in the project.

A World Bank Supervision Mission reviewed the documentation in the project management offices and interviewed the project households and farms. Once

this inconsistency was identified, the Bank discussed it with the project management offices and asked for rectification.

The consistent focus of our work has been that the benefits of cooperatives accrue to the farmers themselves. This requires accountability, and often project teams must provide the checks and balances to correct any imbalances in the system.

*Lesson 3: Standard contracts and registration with the CFPCL help ensure that smallholders are protected.*

The above-mentioned Henan Ecological Livestock Project aims to ensure adoption of improved environmental health management practices on targeted livestock farms. Local authorities are banning smallholders' backyard production because of concerns for food safety, animal health, and public health. As a result, the project emphasizes that it is crucial for smallholder producers to adopt environmentally sound livestock production practices if they want to continue earning their livelihood from livestock production and expand into larger commercial production.

The project's approach is to support farmer cooperatives in building new livestock parks and farms. During project appraisal, the Bank task team found that small producers were discriminated against in ownership and benefit structure when they moved into the parks and farms run by cooperatives dominated by large households. In light of this, the project management offices at all levels are required to use standard contract templates to ensure that small producers receive fair treatment when they join these cooperatives. The contracts state clearly that the small producers should have equity share, have a voice in decision making, and receive shares of profits based on sales.

Task teams have kept a close supervision and support relationship with government partners to ensure that

policies and project standards related to cooperatives are complied with. The goal is to ensure that these organizations are registered in the official registrar office and that they comply with the CFPCL, have adequate capacity to run facilities supported by the project, and can benefit from relevant capacity-building activities. These steps will allow the small producers to hold a cooperative's management accountable and ensure that project investments are owned and managed by the co-op as a whole rather than by the large households. Without proper checks and balances, including through the Bank's involvement, the lion's share of project investments will be captured by large households with strong social and economic connections.

*Lesson 4: To benefit smallholders, the minimum number of members for a meeting should be increased, and any individual's maximum voting right should be reduced.*

Small steps can make significant changes. To ensure that control of cooperatives rests with small producers, who account for the vast majority of cooperative membership, the minimum number of members required to move to a meeting of delegates should be increased significantly. Currently, the CFPCL stipulates 150 members; Germany's cooperative law, by comparison, requires 1,500. Further, any individual member's maximum voting right should be reduced (currently a member can have as much as 20 percent of voting right), and a greater share of operating surplus should be allocated to members based on volume of trade with the cooperatives (currently, 40 percent of operating surplus can be allocated based on investments).

Another area for improving the CFPCL is to better regulate transactions between members and nonmembers. The volume of business with nonmembers currently is not restricted as it is in other countries, such as the United States, where business with nonmembers cannot outweigh business conducted with members.



Cooperative training given to a group of herders in Inner Mongolia.

Finally, the CFPCL should also require the appointment of an external auditor for the cooperative. An external audit is critical to ensure that the cooperative is acting in the best interests of its membership. In particular, the external audit should assess the performance of the board of directors and management in meeting the objectives of the cooperative and ensuring their member-oriented effectiveness.

## CONCLUSION

Changes in China's corporate governance structure are required before significant further success of member-owned and member-controlled farmer cooperatives can be achieved. Specifically, the emergence of stronger minority shareholder protections appears to be a necessary condition, since such protections would signal both a change in the underlying power structure of the economy and a change in the power of small investors at the firm level. These outcomes will require even more fundamental changes in the institutional underpinnings of China's society and economy. The

World Bank and other development agencies need to understand the institutional environment into which cooperatives are being introduced.

The Bank should continue its long-term engagement in developing farmer cooperatives in China and improving the CFPCL. The vision should remain of allowing small producers to be effectively included in modern supply chains and high-value markets. Continued work should focus on the relationship between patron members and investor members, benefit structures, and core-periphery membership. Such initiatives would reflect a multistakeholder process for linking small producers to modern markets and including them in the value chain.

## ABOUT THE AUTHORS

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Approved by Paul Kriss, Acting Manager, Sustainable Development Department, the World Bank Office in Beijing.

## Connecting Fruit Suppliers and Processors: A Comprehensive Approach in Ukraine

*Although Ukraine has some of the best agricultural land in the world, the country's agricultural system lags behind Europe and North America in productivity. This is primarily because of outdated production technologies, lagging skills at the farm level, and limited access to financing and high-quality inputs. There is also a lack of a long-term "partnership" mentality along the supply chain. Modern processors of agricultural products and local farmers don't fully connect—processors often want producers to serve as exclusive suppliers, while producers often prefer bringing their products to the fresh market. This SmartLesson describes how the Ukraine Vinnitsa Fruit Project addressed these issues by working with local farmers so that they could become reliable, high-quality suppliers to Agrana—a large processor. It also shares lessons we learned in the process, some unintentionally, which contributed to overall project success.*

### BACKGROUND

With an excellent climate and nearly perfect soil, Vinnitsa, a region in central Ukraine, is a prime area for growing fruit. This explains why a number of fruit processors have been attracted to the region. One such food processor is Agrana, an Austrian firm majority owned by Raiffeisen Bank—an IFC investment client. The company set up shop in Vinnitsa to produce apple juice concentrate and fruit preparations used for everything from yogurt to Pepsi.

The plant has a total processing capacity of 200,000 tons of fruit per year. At first, it worked at a fairly high capacity use of 60 percent—processing 120,000 tons of fruit per year. But the apple orchards, which have a productive life of about 30 years, had been planted in Soviet times. Their productivity peaked in the 1990s, when the economy was wrenching itself away from a centralized system to a free-market one.

One consequence was that subsequent investments in orchards didn't happen. Everything was neglected, from nurseries to fertilizer. As a result, in the early

2000s, orchards became less productive, and Agrana's processing facility was able to get only 15–30 percent of the inputs it needed, such as apples, pears, apricots, cherries, and berries. So Agrana was not processing as much fruit as its capacity would allow. This is when IFC stepped in to provide some much-needed expertise via the Ukraine Vinnitsa Fruit Project.

IFC has been active in Ukraine since the early 1990s, starting with a farm and land privatization project and then moving to the agricultural supply chains. It partnered with Chumak (a Swedish-owned agriprocessor in Southern Ukraine), Sandora (a leading local juice producer), and Loostdorf Dairy to increase farmer output and quality within their supply chains.

IFC and Agrana agreed that the Ukraine Vinnitsa Fruit Project would focus on apples and berries, with the aim of increasing the raw material base of Agrana by making area growers more productive. Agrana also worked with IFC on the introduction of best practices to farmers, using pilot demonstration farms that allowed new varieties of fruits to be grown using



Demo-field visit at Project annual Seminar, “Growing Strawberries,” June 2011.

different kinds of growing techniques, including different irrigation techniques, fertilizers, and inputs. These techniques were introduced broadly in Ukraine through public education, how-to manuals, and other methods. Besides technical advice, the project helped farmers with business planning and legal issues. Public education programs were held in partnership with Agrana, input suppliers, and financial intermediaries.

The project also convinced Agrana that if a farmer could produce higher quality products and sell part

of the harvest to the fresh market at higher prices, the farmer could generate enough income to invest in new fruit plantations and technological upgrades. This would ensure an increase in fruit production and, as a result, a stable supply to Agrana over the long term. Overall, the project was a success. Farmers were able to meet the needs of Agrana and become more successful as businesses.

## LESSONS LEARNED

*Lesson 1: Get agricultural input suppliers to make pilot farms cheaper and more effective by providing inputs and advice to farmers.*

Pilot farms are a great way to introduce best practices in agriculture to local farmers. They allow experimentation under local conditions without great risk or cost to farmers. However, pilot farms cost money. Besides renting land, you need knowledge, skills, and all of the agricultural inputs, such as seeds, fertilizers, crop protection products, and equipment. It may be possible to get donors to support these investments, but you can stretch donors' funds by having potential beneficiaries provide inputs and advice to the pilot farm. Then use donor funding to involve leading independent consultants who can ensure complete and objective support to the pilot farmer, as well as the effective dissemination of lessons learned.

The Vinnitsa project used agricultural suppliers in this way, including plant material and seed suppliers, crop protection and fertilizer suppliers, and machinery and equipment suppliers. There was a natural incentive for the suppliers to participate: by investing their resources to show farmers new techniques, they were creating a market for themselves. With project support, Vinnitsa fruit farmers invested about \$40 million over six years in new plantations, machinery, and equipment.

In making this happen, our role was to identify the input suppliers and technologies most suitable for the pilot farms, given the demands of the market. We then conducted an analysis to determine the relative benefits of the new techniques over traditional farming methods. Finally, we conducted a number of outreach campaigns (described below) to disseminate the results and, hopefully, achieve greater development impact.

*Lesson 2: Be very, very picky when selecting international consultants.*

Introducing global best practices usually—though not always—involves bringing in foreign experts as consultants. But just because a consultant is a foreigner and has a solid-looking CV doesn't mean he or she will do the job well. The expert you choose can make or break a project. Picking the wrong person can damage your credibility and reduce the impact of your entire project. So it pays to be selective:

- Give potential consultants test assignments. Prepare a hypothetical situation that includes local conditions—describe, for example, legal, climate-related, or logistical challenges—and ask the consultant to explain his or her approach to this situation. Keep an eye out for consultants who factor in local realities when outlining their approach and solutions. This enables you to weed out “cookie cutter” consultants who recommend identical solutions regardless of local circumstances.
- Tap into your network to both identify and check up on the consultant. Global agri-specialists tend to know each other, so if the proposed candidate has a reputation—whether good or bad—you should be able to find out about it. If your network isn't extensive yet, contact IFC agricultural people in investment and advisory services in other countries to find out what they know.
- Look for consultants who know your region. Although there are undoubtedly many excellent consultants in other parts of the world, someone who already has local knowledge is more likely to be effective, because he or she has already ridden up the learning curve. But make sure you don't select someone just because of local experience—think of it as a tiebreaker when you have several experienced candidates to choose from.

*Lesson 3: Don't overload your farmer clients with seminars; use a range of training and coaching vehicles.*

Seminars can be boring if you just throw facts and figures at farmers. A better approach is to organize an annual conference that focuses on a specific, applicable topic, such as growing apples. Because the conference happens only once a year, the key players are more likely to come. Some other benefits of an annual conference include the following:

- The key players, including farmers, processors, input suppliers, and agro-finance institutions, have an excellent opportunity to network. IFC's name provides the stamp of credibility that enhances the reputation of the event.
- The conference provides an excellent way to introduce materials, such as how-to manuals for farmers.
- It enables the results from pilot farm demonstrations to be broadly disseminated.

- The press is more likely to be interested and cover the event, providing broader reach for the messages you wish to convey.

In the Ukraine Vinnitsa Fruit Project, annual thematic seminars were combined with a range of other training vehicles, including practical training and workshops in smaller groups, individual advice and coaching, TV and radio educational programs, and study tours to enable farmers to learn about new developments that could not be introduced through the pilot demo-testing program (because they require larger investments and periods greater than one year to see results).

*Lesson 4: Develop your local staff into highly skilled experts who can provide commercially sustainable extension services.*

Ukrainian IFC staff who worked on the project developed expertise that proved commercially sustainable after the project ended. Thanks to a unique pricing



Study tour to USA, August 2011. Visit to STEMILT (Washington State). Farmers are learning about fruit postharvest handling, storage and marketing technologies.

plan for study tours and assistance, farmers were willing to pay for technical, financial, and legal advice as well as for their training; likewise, the team learned which farmers were willing to pay for these services, and how much. To introduce payment, we began by offering a free study tour to approximately 20 farmers. Later, a second tour was offered at 50 percent of cost, and a third at 80 percent. Farmers were willing to pay at these rates, once they had seen the value of the training and advice received. Subsequent iterations have been conducted with farmers paying the full cost. In short, farmers valued the knowledge and expertise of consultants and IFC staff—and were willing to pay for it. Although this was not an original aim of the project design, it turned out to be a valuable outcome. In the future, project designers should consider making an extension service spin-off part of the project exit strategy. The following are benefits of this approach:

- Local capacity developed and available to farmers postproject;
- Greater long-term impact;
- Higher degree of sustainability;
- More motivated staff.

*Lesson 5: Make the pie bigger by focusing on the viability of farmer suppliers in general, not just on supply issues for your agriprocessing partner.*

Although the project was built around the needs of an agriprocessor partner, we also considered the needs of others in the supply chain. Farmers supply both processors and the fresh fruit market. Naturally, local Agrana management wanted to limit assistance to those farmers who supplied a larger percentage of fruit for fresh markets. We didn't agree, and held a counterintuitive view that turned out to be right: we felt that the best way to ensure good supply for pro-

cessors was to help farmers be successful overall. That is to say, we wanted to help farmers be financially successful by enabling them to sell a larger part of their output to the fresh market, and at a higher price—despite the fact that the ultimate project goal was to increase fruit supply to the processor.

Why? Because farmers that are on a sound business footing make better suppliers overall. Their income is diversified, they are better protected from market risks, and they are more likely to supply Agrana when times are tough.

It took some effort to convince local Agrana management to see this point of view, but in the end they did. In convincing them, we argued that a farmer can only grow his business if his production is profitable and he has enough capital to invest in new developments and growth. Because there is no long-term agrifinancing available in Ukraine, and the fruit business requires long-term capital investments, a farmer can only get sufficient income for investment if he is able to sell to the fresh market, which pays much higher prices. In short, if we want a farmer to be able to invest in new plantations, we need to help him generate enough income from his existing fruit plantations to support new investments.

We thus persuaded the local Agrana management to move from short-term thinking in their attitudes toward their farmer-suppliers to an attitude of sustainable long-term partnership with them. They provided resources to help farmers with their big-picture plans, not just their efforts to supply fruit for processing. The result was more stable, reliable, and loyal suppliers, growing more products.

## CONCLUSION

Managing agricultural supply chains can be tricky, and any project that aims to make them more efficient will have to look at the challenges from many different angles. In some cases we adopted the cor-

rect approach from the start—selecting international consultants, for example. Other elements were lucky accidents, as when our local staff became successful providers of agricultural extension services.

But everything we did had a single focus: helping Ukrainian farmers become successful producers and suppliers. We approached this goal from many angles. We looked at better ways to introduce best practices through demonstration plots at pilot farms and getting the best experts. We developed local capacity and found the best ways for them to deliver the right messages to farmer clients. And we were able to get the agriprocessor to look at the overall health of its supply base rather than focus exclusively on its supply needs.

This long-term, comprehensive approach worked in Ukraine. Although the details may differ, it can work in other countries as well.

## ABOUT THE AUTHOR

Oksana Varodi is an Operations Officer who joined IFC in Ukraine in 1998 as an analyst-assistant to the senior economist in the Farm Reorganization and Land Privatization Project. She has worked on several agribusiness advisory projects, has managed the implementation of the Ukraine Vinnitsa Fruit Supply Chain Development Project, and is currently working on new agribusiness initiatives in the Europe and Central Asia (ECA) Region.

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Demo-field visit at IFC Project annual seminar “Growing Apples,” September 2011. Farmers are learning about new apple varieties introduced by the Project in partnership with Agrana.





Wheat field, Chernihiv, Ukraine.

# It's All About Teamwork: Unlocking Opportunities for Agribusiness in Ukraine

*The Ukraine Investment Climate (IC) Project and the Sustainable Business Advisory (SBA) Food Safety Project in Ukraine formed a partnership—one that has led to tangible results in the form of burdensome regulations being abolished and businesses receiving advice on safety standards that will help them become more competitive in European Union (EU) markets. IC-SBA advice has helped facilitate IFC investments in Ukraine and helped set triggers for World Bank lending. It has also defined the future of the work being done by these two business lines in the agribusiness sector. This SmartLesson relates lessons and experiences of the teams in designing and implementing such an innovative and holistic technical assistance solution, within a specific sector, for government and private sector clients.*

## BACKGROUND

Agribusiness is a key driver of the Ukrainian economy: some 70 percent of the country's total land area is dedicated to agriculture, and over 20 percent of the population is employed in the agriculture sector. However, arcane regulations for agricultural and food products carried over from the Soviet era have held business back in this sector. The regulatory burden is particularly heavy for the food safety system, which should aim to ensure public safety and support the competitiveness of Ukrainian exports. Ukraine's system instead placed a heavy burden on companies, with costly and duplicative controls imposed by multiple state agencies, without adequately increasing the safety standards of food products.

IFC Advisory Services (AS), the Investment Climate (IC) and Sustainable Business Advisory (SBA) teams worked together to address this, streamlining regulations and harmonizing food safety management systems with international and EU best practices. The results of these efforts include the following:

- Mandatory certification of food products (excluding baby food and tobacco and alcohol products) was eliminated, resulting in \$20.7 million annual compliance cost savings for the food processing industry.
- Requirements for costly duplicative licenses for certain agribusiness activities were canceled, including those for wholesale seed trading, raising of domestic animals, and manufacturing of agrochemicals.
- Licenses for trading of agrochemicals and selling of biogas/biofuel, previously subject to five-year renewals, were made permanent.
- The president of Ukraine committed to establish a single food safety controlling agency instead of several agencies undertaking duplicative responsibilities, and prioritized food safety on the deregulation agenda of the Committee for Economic Reforms.
- Amendments to the national food legislation were drafted that will lead to a further reduction of costs to food producers (the estimate of the cost of food-related inspections in Ukraine is \$8.6 million per

year) and an increase in the safety and competitiveness of Ukrainian food products, since requirements will be harmonized with EU requirements.

- The teams helped develop six industry checklists on Hazard Analysis and Critical Control Points (HACCP) in the poultry, eggs, and dairy sectors in collaboration with the Veterinary Service and endorsed by the EU. These are expected to open up new opportunities for exports to EU markets.

Businesses are already reaping the benefits of these improvements. For example, Volodymyr Barabash of the Monomakh tea and coffee company had this to say:

*The cancellation of mandatory certification has been very favorable for us. We import tea and coffee from various parts of the world, and package and sell it in Ukraine. Previously we paid up to \$3,000 a month for certificates, and it took a week and a lot of paperwork to obtain them. We also incurred additional costs of having the container sit at a port in case the certification was delayed for any reason, as customs clearance was not possible without it. So the cancellation of these certificates will literally save us thousands in terms of cost and man-hours per month!*

The agribusiness work in Ukraine serves as an example of a fully integrated country pilot with strong collaboration between IC and SBA on policy and food

Figure 1: Ukraine's Integrated Value Chain



safety, and coordination with other AS business lines and Investment Services (IS) to address additional challenges along the value chain (see Figure 1).

From the investment climate side, this project was innovative in many ways and yielded lessons that are helping shape our approach to other agribusiness interventions in the Europe and Central Asia (ECA) region and elsewhere.

## LESSONS LEARNED

*Lesson 1: Don't just give lip service to collaboration: "walk the talk" through an integrated approach across business lines.*

The Ukraine Investment Climate Project worked jointly with the SBA Food Safety team from an early stage, sharing staff and resources:

- There was a clear and full complementarity between IC focusing on policy work and SBA focusing on firm-level work to present a unified private sector reform agenda.
- There were three staff, shared 50/50 between IC and SBA, that had joint results agreements, dual clear reporting lines, and clear guidelines to deliver the joint components between IC and SBA.
- On the investment climate side, there was also the element of sharing knowledge between the global and country team, with the agribusiness component team leader's time shared 50/50 between HQ and the IFC region.
- The teams held joint planning meetings and also tested approaches to jointly developing research products (as outlined in Lesson 2, below).
- The teams also held regular meetings and updates with all other agribusiness-related AS projects and IS to check on progress on joint strategic objectives.

These efforts helped shape a joint technical assistance intervention that addressed issues both at the government/policy level and at the firm level.

*Lesson 2: Innovative industry-specific diagnostics helped set clear reform targets and create consensus on reform priorities.*

An objective of the IC work was to use research and diagnostic tools to help kick-start the dialogue with government, the private sector, and other stakeholders. One of the studies produced jointly with the SBA team and widely promoted to stakeholders was the report, "Reforming Food Safety Regulation in Ukraine—Proposals for Policymakers," which emphasized the urgent need for change in policies governing this critical sector. The IC team also produced another report, "Investment Climate and Industry Competitiveness in Ukraine—an Industry-Level Regulatory Analysis of the Impact of Food Safety Regulation on the Dairy Sector in Ukraine," which constitutes a first IFC analytical pilot combining the strengths of both industry-level value chain competitiveness analysis<sup>22</sup> and regulatory analysis of the economic impact of regulation on the private sector through the standard cost model (SCM) analysis.<sup>23</sup>

The value chain analysis presented in the report focused on the industry-specific regulatory framework (food safety regulation) as a way to provide an objective and quantitative reference point for addressing sector-specific regulatory constraints of the investment climate. At the same time, the report followed the view that better regulation is crucial to enabling private sector-led growth and improving both econ-

<sup>22</sup> See, among the vast literature on the subject, "Moving Toward Competitiveness: A Value Chain Approach," FIAS, The World Bank Group, 2007.

<sup>23</sup> Also see, among the vast literature on the subject, "International Standard Cost Model Manual: measuring and reducing administrative burdens for businesses," Standard Cost Model Network, 2008.

omy-wide and industry-specific competitiveness. A central aspect of better regulation relates to minimizing the administrative burden of compliance with regulatory requirements for the private sector.

More specifically, the SCM methodology and value chain analysis were combined to identify and assess the impact of all relevant types of regulatory (food safety) requirements (permits, licenses, certifications, inspections, conformity assessments, and so on) affecting the selected industry. This was a significant change from the traditional “horizontal” approach to regulatory analysis, in which the SCM methodology is used to assess the administrative burden of a specific type of regulation (inspections regime, or licensing regime, or permits regime, or product certification, and so on) without taking into account the cumulative effect of the different types of “horizontal” regulation on industry-specific dynamics.

A second significant synergy resulting from the combination of the value chain and SCM methodologies relates to the ability of this joint approach to identify and assess the distributional effects of a specific piece of regulation throughout the selected value chain, and to estimate the differential impact of policy proposals on the various stages (and stakeholders) of the chain.

### *Lesson 3: Taking a focused and industry-specific approach to reform can generate big wins.*

A number of countries have invested significant amounts of resources and effort in undertaking reforms to their business environment. However, most of these reform efforts are “industry blind,” because they seek to address economy-wide regulatory obstacles. Although these types of economy-wide reforms are often required to level the playing field for competitive businesses, combining or following these reforms with sector-specific initiatives can significantly enhance the probability, type, and extent of measurable impacts (as illustrated by the rise of elec-

tronics in Malaysia and high-tech clusters in East Asia, car parts and assembly in Eastern Europe, salmon farming in Chile, wine in South Africa, among others). For a country seeking to increase the competitiveness of its established businesses and attract new foreign and domestic investment, a sectoral approach to reform and investment generation is complementary and often necessary for success.

In Investment Climate, the idea of sector-specific policy reform is a relatively new one, being honed through projects such as this one in Ukraine, the success of which has set the stage now for a next phase of an Investment Climate program focused fully on agribusiness reform.

### *Lesson 4: Go West—customize the intervention to meet the client’s priorities.*

The need to open up Ukrainian businesses to EU markets was a key factor that the project team highlighted to keep the momentum on these reforms alive. In fact, a key challenge faced by food processors, even the ones with advanced facilities, is that access to the EU market is conditional on EU recognition of the Ukrainian public food safety controls system. A key lesson here is that the IFC team adopted a gradual, yet strategic, advisory support engagement by assisting the Ukrainian State Committee for Veterinary Services (a unified agency responsible for food safety in the country since 2011) in the development of EU-compliant food safety controls procedures and checklists for priority agribusiness value chains with regard to export potential (see results in the “Background” section, above). The prospects of enabling greater exports of food products from Ukraine to the EU, opening the huge new market for Ukraine’s food processors, helped create strong support for reform from the private sector, since this was fully aligned with their business priorities.

*Lesson 5: The battle of the giants for Ukraine’s agribusiness development—get the World Bank and IS on board to leverage the AS offerings.*

The Investment Climate team also worked closely with the World Bank to leverage policy lending. In Ukraine, agricultural policy and any agribusiness-related reform initiative is a “big ticket” policy item, given the sheer importance of the sector in the national economy. In this context, a small project, such as IC, had to play it smart and join forces with the “Big Sister” (the World Bank) to include the key investment climate reform priorities on food safety among the

overall economic policy reforms as part of the policy lending negotiations with the government. The key success factor of the internal “deal” was that the Bank put its financial weight behind the investment climate policy triggers included in the policy lending relative to the government of Ukraine, while the IC team worked on a daily basis with the government agencies charged with implementing the reforms to build their capacity to adopt and operationalize them.

Collaboration between IC and SBA helped closely align with the IFC Investment Services agribusiness strategy in Ukraine and in ECA. The AS teams have



Fresh market, Chernihiv, Ukraine.

worked closely with the IS team and advised two IFC Investment Services clients in Ukraine—Globino and Khliprom—on improving food safety management systems and introducing HACCP. This advice has facilitated \$25 million in investment so far, as well as a combined \$24 million increase in sales.

## CONCLUSION

The Investment Climate and Food Safety projects in Ukraine came together in a way that has set a standard for collaboration between the IC and SBA business lines. The great teamwork and innovation seen in this partnership have built a base for strong collaboration with other AS and IS units at IFC and with the World Bank. It has also generated strong learning and knowledge, which is now being applied across other agribusiness projects across ECA: the IC and SBA teams are working together in Georgia, Belarus, and Moldova, with additional projects in Armenia, Tajikistan, and the Balkans in the pipeline. For Investment Climate, the work in Ukraine serves as a model for a growing agribusiness portfolio and pipeline that spans every region, and it has fed into the new strategy for Investment Climate that is more focused on sector- and industry-specific reforms.

## ABOUT THE AUTHORS

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