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**Cracking  
the Nut® '16**



**Regenerating Rural  
& Agricultural  
Development** | **Lessons from  
the 2016  
Conference**



## Cracking the Nut 2016: Regenerating Rural and Agricultural Development

- ▶ Regenerating Rural and Agricultural Landscapes
- ▶ Financing Environmentally Sustainable Development
- ▶ Encouraging Investment in Climate-Smart Agriculture

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## Cracking the Nut 2016: Regenerating Rural and Agricultural Development

► Regenerating Rural and Agricultural Landscapes

► Financing Environmentally Sustainable Development

► Encouraging Investment in Climate-Smart Agriculture

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- |                        |                      |                       |                        |
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# Acronyms

ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AWIT	African Women in Technology
BDL	Bio-reclamation of Degraded Lands
CRS	Catholic Relief Services
CSA	Climate-Smart Agriculture
CSP	Climate Services Partnership
FAO	Food and Agriculture Organization of the United Nations
FMNR	Farmer Managed Natural Regeneration
GIS	Geographic Information System
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
KGM	Keurig Green Mountain
MAIS	Modulo Agroclimatico Inteligente e Sustentavel
NABARD	National Bank for Agriculture and Rural Development (India)
NGO	Non-Governmental Organization
PCE	Projet Croissance Economique
PPP	Public-Private Partnership
RSPO	Roundtable on Sustainable Palm Oil
SDGs	Sustainable Development Goals
SILC	Savings & Internal Lending Communities
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WALA	Watershed and Agriculture for Life Advancement
WASH	Water, Sanitation and Hygiene
WSA	Water-Smart Agriculture



# Forward

Dear Fellow Nutcrackers,

Participants from 49 countries attended this year's Cracking the Nut 2016 to discuss "Regenerating Rural and Agricultural Development." This learning event was timely given the increasing appreciation for the fact that we need to do more than just halt deforestation in order to protect our natural environment. Last year's agreement at the United Nations' Climate Change Conference in Paris emphasized the importance of replenishing deforested lands, which is key to "regenerating" rural and agricultural development and to allowing us to produce sufficient food to feed our expanding global population.

Some argue that we have already gone beyond the point of no return, as the polar ice caps are melting and putting the entire world at risk of large releases of methane gas. If that happens, global warming would rapidly accelerate and raise average global temperatures beyond 2°C, a level considered disastrous. Personally, I am more of an optimist, believing that when great minds come together we can identify creative solutions to the world's problems. Responsibility for action must begin with us, and the participants of Cracking the Nut 2016 are the some of the main leaders of this important initiative. While this conference's various sessions highlighted important approaches to climate change mitigation and landscape regeneration, this conference's participants continue to play a significant role in helping developing countries adapt to the negative impacts of climate change. This is important because the majority of investments to date have been related to climate change mitigation, in renewable technologies, clean energy and carbon sequestration. Climate change adaptation strategies are especially important given the "lopsided effects that climate change has on the world's poor" (Naki Mendoza, Devex, Jan. 14, 2016). In other words, rural and agricultural development efforts have the best opportunity to contribute positively (or negatively) to climate change. I know that the Cracking the Nut participants are committed to maximizing positive impacts for our people and planet; and I thank them for joining us in the dialogue and in tackling this global challenge.

Warm regards,

Anita Campion  
President and CEO





## Executive Summary

**T**he learning event, *Cracking the Nut 2016: Regenerating Rural and Agricultural Development*, was the sixth Cracking the Nut event. The conference took place March 1-2 at the Enrique V. Iglesias Conference Center in Washington, D.C., and generated the following lessons.

### Regenerating Rural and Agricultural Landscapes

Both the public and private sectors are increasingly applying landscape regeneration approaches to agricultural development. In order to restore landscapes, a number of issues need be addressed, including appropriate soil and water management. The following lessons learned can be applied when regenerating rural and agricultural landscapes.

- **There are many easy and practical ways to regenerate soil quality in order to restore agricultural productivity.** These include building contour rock walls, planting grass barriers, and inter-cropping with green manure/cover crops among others.
- **Through the restoration of degraded landscapes, farmers can improve soil quality and water conservation, as well as meet rural household energy needs.** Promoting the restoration of appropriate tree species to degraded lands can improve soil fertility and moisture. Assisting households to more effectively use fuel wood can also reduce the demand that leads to deforestation and degradation in the first place.
- **Water-smart agriculture has the potential to dramatically increase rainfed agriculture production and food security, but there needs to be more engagement with policy makers in order to scale investments and practices.** Water-smart agricultural practices, such as limited tillage and inter-cropping, can improve water productivity and increase rainfed yields. CRS now operates as a “development entrepreneur” to design long-term solutions for water-smart agriculture approaches and identify reforms that work even in difficult political and economic environments.
- **Degraded landscapes can be regenerated in a way that empowers women and provides economic and nutritional benefits to households.** In Niger, women use the Bio-reclamation of Degraded Lands (BDL) agroforestry system to farm on degraded lands that men do not want. The system incorporates high value, nutritious trees and vegetables, which can be consumed at the household level or sold at the market. As a result of access to land and increased incomes, women have been empowered to make more economic and household nutrition decisions.
- **Afforestation<sup>1</sup> of non-arable lands can increase the agricultural potential of landscapes nearby and mature trees can serve as an alternative income source for producers.** In the Andean region of Bolivia, DESEC has been working with community-based forest committees to plant 13.9 million trees in high altitude areas that are unsuitable for growing crops. The project has resulted in a 70% increase in the moisture in lands located at the foot of forests and increased the average annual income per family.
- **Diverse strategies to regenerate and maintain threatened landscapes should be adjusted for the local context and may require subsidies to encourage initial uptake.** Chemonics is implementing different landscape regeneration approaches in southern Africa, Haiti and Mali. In each country, Chemonics takes into account the unique geographic, climactic and cultural considerations and adapts the approaches appropriately in order to gain local buy-in and ensure sustainability. Subsidies are also important to create sustainable economic incentives at the individual or MSME level.

<sup>1</sup> Afforestation is the establishment of trees where there were none previously.





### Financing Environmentally Sustainable Development

There are many risks and challenges associated with financing development at scale, due in part to large transaction costs and high perceived risks. This is especially true when solutions incorporate climate-smart agricultural practices and technologies. These lessons learned highlight several strategies that development practitioners, private sector companies, and financial institutions are implementing to overcome the challenges associated with financing environmentally sustainable development, especially in rural areas.

- **Finance can be used to reduce detrimental impacts on the environment, even for crops that historically have had negative environmental effects.** By encouraging small producers of palm oil to use sustainable production practices, the social impact investor, Oikocredit, was able to help the industry reduce its environmental footprint.
- **Farmers need financing for irrigation in order to be more precise with their farming techniques, to intensify their practices, to increase production and to adapt to changes in the climate.** A partnership between CRS, The Toro Company and Opportunity International in Malawi facilitated smallholder farmers with access to finance for drip irrigation, which has helped local communities to manage water more effectively and become more resilient to climate impacts.
- **Community-level social entrepreneurs can play an important role in encouraging climate-smart agricultural practices and facilitating access to finance.** The independent franchisees of CultiVert provide 800,000 people with access to a broad range of products and services including high-yielding crop varieties, short-cycle and bio-fortified crops, climate adapted technologies, livestock, nutritional products, products for hygiene and sanitation, as well as business development services, insurance, and credit.
- **Local community participation is important when financing micro-watershed projects that help to conserve soil and water resources.** India's National Bank for Agriculture and Rural Development (NABARD) has implemented a successful micro-watershed development model with local communities, financing two million hectares of farmland across India. This has improved soil and water retention, crop diversification in tune with local natural resources and more resilient communities.
- **Agricultural insurance can help to reduce risks and smooth income variability, reducing the potential for catastrophic impacts related to climate change.** In Senegal, the Feed the Future Naatal Mbay project has set up risk-sharing partnerships and embedded insurance into cash-flow based seasonal loan payments in order to decrease the overall risk borne by financial institutions and allow for easier facilitation of credit. They have seen a quick scaling up from 24 policies purchased in 2012 to 3,087 insurance policies covering 3,945 hectares in 2015, with the goal to reach 150,000 households by 2019.

### Encouraging Investment in Climate-smart Agriculture

In addition to debt financing, investments in climate-smart agriculture can take the form of public goods in climate information services or knowledge enhancement, as well as public-private partnerships and long-term investments in training and agricultural risk reduction. These lessons learned explore some of the broader ways that climate-smart investments take place and the role that they can play in encouraging smallholder uptake in climate-smart agricultural practices.



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- **Climate services can help to reduce uncertainty and improve predictability through accurate seasonal forecasts, which is needed to encourage farmers to invest in climate-smart agriculture practices, such as in new seeds and technologies.** In Kazakhstan, Engility developed a platform to analyze seasonal temperature and precipitation data to create seasonal climate and crop forecasts. The information was then used to make key decisions, such as moving away from the wheat monoculture toward improved soil management, including no-till and low-till climate-smart agricultural practices.
- **Public-private partnerships (PPPs) can be powerful tools in promoting climate-smart agriculture and restoring the natural environment.** In Vietnam, SNV established a public-private partnership with Minh Phu Seafood Corporation, shrimp farmers, and the local government to reverse the mangrove deforestation trend by incentivizing and empowering smallholder shrimp farmers to meet organic certification standards.
- **Investing in gender-sensitive agricultural technologies can be used to economically empower women by increasing income and reducing labor time, as well as boosting agricultural yield, eliminating food waste and improving food security.** Women innovator groups can quickly identify, propose and design improved labor-saving agricultural tools and processing technologies. Rapid prototyping of tools and using on-farm trials with women innovator groups leads to tools that are gender sensitive and have a high likelihood of adoption.
- **A bottom-up approach is needed to encourage investment in climate-smart agriculture, beginning with resiliency training and ensuring that agricultural cooperatives have an active role in determining and implementing the strategy.** In the Sertão region of Brazil, Adapta Sertão has worked with six agricultural cooperatives to design and implement a climate-smart agricultural production system called MAIS, which includes technical assistance by SENAR and access to credit through a pilot fund managed by the national banks. By engaging the cooperatives along with relevant actors, it ensures that the policies are suitable and viable for the specific local conditions.
- **To encourage climate-smart agriculture, approaches and investments need to be accessible and affordable, and help farmers reduce risk.** Due to high costs, irrigation was unavailable for the apple value chain in Nepal. Instead, snow harvesting was the solution identified, including water use efficiency, eco-friendly agronomic practices and financing through local banks (bundled with crop insurance). As a result, survival rates of transplanted seedlings improved from 50% to 95% over the three-year life of the project.
- **Diversification of investments at the farm as well as household level can increase agricultural yields, income and nutrition.** The inter-cropping of beans and other crops with coffee can help to improve soil fertility and provide shade for coffee, resulting in improved yields. It also allows farmers to diversify their farm incomes, even out their cash flow, and improve household food security and access to diversified foods, such as enset (false banana) and cassava.
- **To encourage rapid adoption of climate-smart technologies, smallholders often need additional assistance.** There is a need from both public and private sector organizations to encourage smallholder farmers to rapidly adopt climate-smart technologies through both incentives and provision of services, such as technical assistance or access to finance.

More research and investment is needed on how to sustainably support climate change adaptation strategies. Perhaps we should take a closer look at how these investments have been made in urban areas to extract additional lessons that can be applied to rural and agricultural climate change strategies? As global population is exploding, more and more people are migrating to cities and urban areas. As a result, a growing proportion of the food insecure live in urban areas, where resources are increasingly stretched.



# Introduction

**T**he focus for the Cracking the Nut 2016 conference was “Regenerating Rural & Agricultural Development.” As a community of international development practitioners, agronomists, donors and private sector stakeholders who are engaged in creating shared value, we came together to learn from each other about how to replenish deforested lands, finance environmentally sustainable development and encourage investment in climate-smart agriculture.

In her keynote address, Dr. Nancy Stetson, U.S. Special Representative for Global Food Security, impressed upon the audience that the implications for global food security extend far beyond hunger to include national security concerns. From 2006 to 2009, Syria experienced an extreme drought that triggered a migration of 1.5 million people from farms and rural areas to urban centers. In 2011, this mass scale migration added fuel to the political unrest which was a major factor contributing to the Syrian civil war. The war in Syria is complex, and yet it is an example of how the lack of economic opportunities, food insecurity and climate change impact global security today.

Dr. Stetson praised the new Sustainable Development Goals (SDGs) that balance the economic, social and environmental facets of development. Under these new goals, Dr. Stetson explained how over the next 15 years, the world will aim to end poverty and hunger, protect the planet and ensure prosperity for all, in the context of the conference’s three themes:

### Theme 1: Regenerating Rural and Agricultural Landscapes

The public and private sectors working together can provide momentum to the movement of restoring deforested areas and depleted soils while improving agricultural productivity. Dr. Stetson emphasized the need for the development community to embrace the sustainable landscapes model and move beyond conservation to repair and regeneration. She highlighted the benefits of climate-smart approaches, including agroforestry, silvo-pastoral systems and bio-reclamation that replenish soil, sequester carbon and increase agriculture as well as animal productivity. Regenerating the world’s rural and agricultural landscapes will require incentivizing behavioral changes and climate-smart adaptations for both smallholders and large-scale agriculturists.

### Theme 2: Financing Environmentally Sustainable Development

Dr. Stetson argued that we need to focus on the challenges of increasing access to finance, inputs and training for environmentally sustainable development. We must create financial innovations that shift entire value chains toward eco-friendly production systems. She encouraged the exploration of ideas for integrating finance and insurance to create incentives for climate-smart practices. Apart from continuing our work in strengthening public-private partnerships and development aid, we also need to channel foreign direct investment and domestic private and public resources in developing countries.

### Theme 3: Encouraging Investment in Climate-smart Agriculture

Dr. Stetson highlighted the AgroLAC 2025 platform (see Box 1.1) as one excellent example of a model for encouraging funding and coordinating the efforts of a wide range of partners in climate-smart agriculture. The time for the global community to step up is now. Important work needs to be done toward figuring out how governments can create enabling environments for climate-smart policies and practices and to stimulate and encourage investment in climate-smart agriculture.



## Cracking the Nut 2016: Regenerating Rural and Agricultural Development

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### Box 1.1: AgroLAC 2025 Multi-Donor Platform

In recognition of the need for technical assistance to support climate-smart initiatives and the great potential for sustainable intensification of production in Latin America, the Inter-American Development Bank launched AgroLAC 2025. A multi-donor grant platform, AgroLAC 2025 aims to mobilize US\$50 million of public and private sector funds to support sustainable agricultural practices and market systems in Latin America and the Caribbean. These grant funds will be used to support smallholders with extension-like services and to build trust in value chains. As Ginya Truitt Nakata of IDB reminded us, “We need to keep in perspective that smallholders are an important part of the private sector.”





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# **Regenerating Rural and Agricultural Landscapes**





**B**oth the public and private sectors are increasingly using landscape regeneration approaches for agricultural development. In order to restore landscapes, a number of issues need be addressed, including appropriate soil and water management. Soils must be restored back to a healthy state, which can be done through a number of practices, such as EverGreenAgriculture<sup>2</sup> in Africa, or afforestation approaches in Latin America. Water management also plays an important role, especially in areas where rainfall is low, and often times there is a need to improve the capacity of soil to retain moisture and implement water harvesting techniques. When combined, proper soil and water management can help to restore even the most degraded landscapes as in the case of Niger. This section will look at the different approaches practitioners are using around the world to regenerate rural and agricultural landscapes.

### Aha Moment!

Are fertilizer companies against soil regeneration as it reduces the need to buy fertilizers? Progressive fertilizer companies realize that farmers don't profit as much from fertilizer usage when the soil quality is poor. So, the promotion of soil regeneration practices are not threatening to fertilizer companies.

## Lesson 1: There are many easy and practical ways to regenerate soil quality in order to restore agricultural productivity.

Poor soil quality and soil erosion is playing a huge role in creating droughts. Ethiopia is currently facing one of its worst droughts in 50 years. However, soil can be regenerated and droughts can be largely overcome by practicing climate-smart agriculture and planting in a way that protects natural resources.

Soil is being depleted of organic matter, but there are many easy and practical ways to restore soil. For example, on fields that have less than a 25% slope, farmers can contour rock walls to form terraces (however this is labor intensive). Ditches can be reinforced with a grass barrier so that topsoil and rainwater is not lost. Grasses, such as Napier grass, can be used to create barriers and is also good for cattle feed. On steeper slopes, micro terraces can be built and this significantly increases the rainwater available to crops.

Farmers can also inter-crop with green manure/cover crops, which can go a long way in increasing soil fertility and yields. Inter-cropping with green manure/cover crops is inexpensive, the labor costs are low, and the plants often offer weed control. Many of these green manure/cover crops are different types of beans that are nitrogen fixing for the soil and a good source of protein for the household.

Agroforestry can regenerate drylands and provide resilience against global warming. The World Agroforestry Center is promoting the concept of 'EverGreen Agriculture.' This is a vision of a more agro-ecologically intensive farming that integrates trees directly into crop and livestock production systems.

**Figure 1: View of Southern Niger in the 1980s**



*Photo credit: World Agroforestry Center*

**Figure 2: More Recent View of Niger Farmlands**



*Photo credit: World Agroforestry Center*

<sup>2</sup> EverGreen Agriculture is a vision of a more agro-ecologically intensive farming that integrates trees directly into crop and livestock production systems.



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Currently 17 countries are engaged in EverGreen Agriculture, where farmers are managing natural regeneration, practicing conservation agriculture with trees and inter-planting trees in conventional tilled cropland (see Box 2.1).

National policy is important for agroforestry and its widespread adoption. Traditional extension systems need to be trained in agroforestry. Markets also need to provide farmers with access to inputs like high quality bean seeds.

### **Lesson 2: Through the restoration of degraded landscapes, farmers can improve soil quality and water conservation while meeting rural household energy needs.**

Land productivity is declining around the world, in both developing and developed countries. Restoring degraded lands is a key priority as demonstrated by the 2011 Bonn Challenge, which calls for 150 million hectares to be restored by 2020, and the New York Declaration, which calls for 350 million hectares by 2030. Approaches, such as Farmer Managed Natural Regeneration (FMNR)<sup>3</sup> and EverGreen Agriculture (see Box 2.1), promote the restoration of appropriate tree species, including nitrogen-fixing trees, to degraded lands in order to improve soil fertility and moisture. Combined with proper management, farmers can increase and improve production as better quality soil leads to higher yields and inputs, such as seeds and fertilizers, become more effective. In addition, the trees can be used for fodder for livestock in the dry season, provide alternative income sources as well as a source of fuel wood for households. Assisting households to more effectively use fuel wood can also reduce the demand that leads to deforestation and degradation in the first place (see Box 2.2).

#### **Box 2.1 Using EverGreen Agriculture to Increase Food Security in Zambia**

In Zambia, more than 160,000 Zambian farmers have used EverGreen Agriculture practices to plant rows of *Faidherbia albida* trees in maize fields on an area of over 300,000 hectares. When combined with conservation agriculture practices, such as minimum or zero tillage, keeping soil covered with organic material and rotating and diversifying crops, it has proven to be successful and helped farmers to increase production. This in turn has allowed farmers to become more food secure and allows them to use additional income earned to pay for household expenses, such as school fees, healthcare and higher value foods, e.g., meat and fish.

#### **Box 2.2 Increasing Cooking Efficiency to Reduce Degraded Landscapes**

In Africa, 90% of the wood consumed is used for wood fuel and charcoal and in the next 30 years, the number of charcoal users will double.<sup>4</sup> The demand for fuel wood and charcoal plays a large role in the deforestation and degradation of landscapes around the world, but especially in sub-Saharan Africa where 300 million tons of wood a year is consumed for cooking fuel. Furthermore, the use of outdated cooking equipment causes inefficient combustion, meaning that 90% of the wood's energy is wasted.

*(continued on next page...)*

<sup>3</sup> FMNR is the systematic regeneration of trees from living stumps, roots and seed. Trees are regenerated naturally, not planted.

<sup>4</sup> Riccardo Pravettoni and GRID Arendal, *The Environmental Crime Crisis*, 2014. [http://www.grida.no/graphicslib/detail/wood-charcoal-production-in-africa\\_ce48#](http://www.grida.no/graphicslib/detail/wood-charcoal-production-in-africa_ce48#)



(...Box 2.2 continued)

To overcome this challenge, Envirofit International has designed low-cost, high quality clean cookstoves that benefit both the household and the environment. With subsidiaries in East and West Africa, Asia and Latin America, Envirofit offers 12 different cookstove models, which are designed according to the needs of the specific markets. Using a market-based approach, Envirofit builds local distribution networks (including women's groups) through which it provides education and marketing support.

Research has shown that the impact of access to clean cookstoves means 50% reduced cooking time, 60% reduced fuel requirement and 50% reduced fuel costs. Cookstoves also lead to a reduction in CO<sub>2</sub> emissions by 60% and 40% reduction of black carbon. To date, Envirofit has served one million customers, impacting five million people across the globe. By helping households to use fuel wood and charcoal more efficiently through clean cookstove technology, Envirofit International not only improves households, but also the environment through reduction in CO<sub>2</sub> and black carbon emissions. Moreover, the efficiency gained from using cookstoves diminishes the demand for cooking fuel, which leads to deforestation and degradation in the first place.

### **Lesson 3: Water-smart agriculture has the potential to dramatically increase rainfed agriculture production and food security, but there needs to be more engagement with policy makers in order to scale investments and practices.**

There has been an increase in global food production in the last 30 years that has been driven in large part by the expansion of irrigation (which relies on blue water resources). However, research by the International Water Management Institute shows that irrigation is hitting its limits in many regions around the world as there are groundwater collapses and river basin closures. Currently, nearly  $\frac{3}{4}$  of crops are produced on rainfed lands (which relies on green water resources), but rainfed agriculture has been largely neglected by governments and donors in favor of irrigation. Given the stress on blue water resources, many are now looking at how to improve green water management, as rainfed agriculture presents the biggest opportunity to increase productivity, especially with smallholders where yields are the lowest. Rainfed yields can be boosted 2-3 times if cereal yield levels are at 1t/ha through better water management, soil improvement and diversification (see Figure X).

Good soil management practices, such as reduced tillage and inter-cropping, are especially important for soil to maintain moisture and fertility, thus improving water productivity and increasing yields. The green water approach and the land use practices that improve green water productivity are part of a movement called Water-Smart Agriculture (WSA). As a leading proponent of WSA, CRS has implemented the approach in Honduras and Nicaragua through what is called the Quesungual System and evidence has shown increases in rainfed agricultural productivity and food security as a result (see Box 1.3).





### Box 2.3 The Quesungual Slash and Mulch Agroforestry System

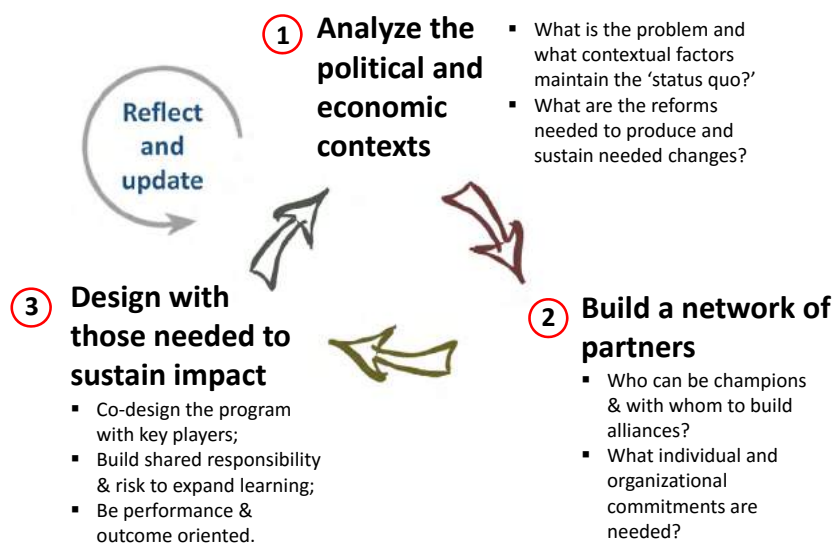
In southwest Honduras and Nicaragua, over 6,000 farmers on 5,000 km<sup>2</sup> are practicing water-smart agriculture through the Quesungual System. In agricultural areas where the soils are highly weathered, i.e. very acidic, with high aluminum content and low soil organic matter, the Quesungual system promoted and implemented five principles with farmers to improve soils and increase water productivity:

1. Intercrop trees with crops and pasture
2. “Slash and mulch” – no burning
3. Permanent soil cover – mulch from trees, shrubs, weeds and crop residue
4. Minimal disturbance of soil – no tillage direct seeding
5. Efficient use of fertilizer

As a result, farmers have been able to more than double their productivity from 1.2 MT to 2.7 MT/ha in maize and from 0.3 MT to 1.2 MT/ha in beans. They have also increased soil moisture in the dry season, improved water filtration, had healthier soils and improved net incomes.

To scale investment and sustain water-smart agriculture interventions, such as the Quesungual System, CRS has changed its approach, to think, design and act from scale. CRS is moving from direct project implementer to a catalyst for changing policies and investments among key private, public and producer sector actors. Realizing that having a technically sound approach is not enough and that the policy and politics realm is what “moves the needle,” CRS now operates as a “development entrepreneur,” using entrepreneurial methods, including iterative ‘learning by doing’ and making ‘small bets’ to find ways of introducing reforms that work even in unpromising political-economic contexts. One example of a ‘small bet’ that CRS is making is coordinating farmer experimentation with national public and private agencies/enterprises to produce evidence together that serves to mobilize interest and investment in the WSA approach. The bets are small, but they are tied together in a process of linking the actors who each play a role in the process of supporting this shift in the agricultural paradigm. By using this new program logic (see Figure 3) to work differently with donors, governments and other actors who have a vested interest in increasing agricultural production and food security, CRS has been able to support public, private and producer sectors to design long-term solutions for soil restoration and water-smart agriculture.

Figure 3: “Lift the Gaze” Program Design Cycle





### Lesson 4: Degraded landscapes can be regenerated in a way that empowers women and provides economic and nutritional benefits to households.

Developed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Bio-reclamation of Degraded Lands (BDL) is an agroforestry system that incorporates high value trees and vegetables in a holistic system, with the aim of reversing damage to soils caused by overgrazing and intensive farming. In Niger, where the system was developed, BDL is mostly practiced by women on degraded lands where there is no topsoil. Because the land is unable to support traditional agricultural production, men are not interested, but they will rent the land to women or transfer ownership. The BDL consists of two main components: 1) water-harvesting techniques and 2) high value and nutritious trees and annuals. The different water-harvesting techniques include demi-lunes for trees, zaï holes for annuals and trenches. Examples of high value trees and annuals include the Moringa tree, the Pomme du Sahel tree, Okra, Roselle and Senna Obtusifolia, among others. Through the different harvesting techniques, rain water is stored to sustain trees and crops in the dry period. The system also uses micro-dosing of fertilizer for zaï holes to stimulate root growth of vegetables and promote better nutrient utilization. The BDL system helps to regenerate the landscape by improving soil fertility through carbon sequestration in the roots of the crops planted as well as helps to reduce soil erosion. Implementation of the BDL system by CRS (see Box 2.4) has increased women's empowerment and resulted in economic and nutritional benefits, as the crops are sold at a higher price than traditional cereal crops and are more nourishing. For example, the nutritional content of 100g of Moringa contains four times the Vitamin A of carrots, two times the protein of yogurt and four times the calcium of milk. Households also are able to take advantage of the benefits in the same cropping year and do not have to wait years for trees and crops to start producing.

**Figure 4: Demi-lunes**



Photo credit: CRS Niger

**Figure 5: Zaï Holes**



Photo credit: CRS Niger

#### Box 2.4: Using BDL to Improve Household Food Security

In Niger, CRS is working with ICRISAT to employ the BDL system as part of the USAID/Food for Peace project, *Programme d'Appui à la Sécurité Alimentaire des Ménages-Tanadin Abincin Iyali* (PASAM-TAI), which tackles food security and malnutrition through water, sanitation and hygiene (WASH) programming. The process for developing the BDL system is as follows:

1. CRS facilitates negotiations with the village development committees, land commissions or owners and women's group for the degraded land,
2. Document and legalize lease or ownership agreements,
3. CRS field agents and government extension staff train women's groups on BDL,
4. Develop degraded land by improving soil organic matter, water infiltration hence soil fertility
5. Plant seedlings and annual crops at the onset of rainy season, and
6. Harvest crops for household consumption or sale at the local market.

(continued on next page...)



*(...Box 2.4 continued)*

Throughout the process, CRS provides monitoring and support to women's groups. As of 2015, CRS has implemented the BDL system in 172 villages in a land area of 240.57 hectares with 10,770 women. In a recent impact evaluation, initial results show that the practice of the BDL system had a positive effect on women by giving them access to land and increasing their income. On average, the household income of women participants increased by 14,345 FCFA, which is approximately a 50% increase over non-BDL participants. The project does face various challenges, which include the need for fencing of fields to protect from cattle and other animals and for perennial crop watering at the height of the dry season.

### **Lesson 5: Afforestation of non-arable lands can increase the agricultural potential of landscapes nearby and mature trees can serve as an alternative income source for producers.**

Different from agroforestry, afforestation of lands that are unsuitable for agriculture can still help to improve agricultural production as the creation of forests has positive effects on soil humidity levels and helps prevent soil erosion in areas near the forest. In addition, forestry does not require a full-time commitment, but rather it is compatible with farming. Once the trees are mature, the owner can benefit from additional income earned through selling timber or secondary activities, such as mushroom production. Harvesting of wood can occur all year round, giving owners the option to cut when it is most convenient for them. The greatest challenge to afforestation programs is that it is a long-term activity; for example, pine trees on average take 15 years before the first cut can be made. And depending on the country, government regulations can create challenges. In Bolivia, a 30-year old community-based program demonstrates that there can be multiple environmental and economic benefits to afforestation (see Box 2.5).

#### **Box 2.5: Community-based Afforestation in Bolivia**

In the Andean region of Bolivia, since 1984, a local NGO, DESEC, has been working with community-based forest committees to plant 13.9 million trees, the majority of which are pines. Trees are planted in high altitude areas that are unsuitable for growing crops, but normally have agricultural lands close by. DESEC helps facilitate the creation of local forest committees, provides training to the committees and coordinates with them to define the land for the plantation, to plant the trees, prune the trees, negotiate the sales agreements and harvest the wood. The communities provide the land and labor for the tree planting while DESEC provides seedlings and technical support. The community is the owner of the plantation and when the forests become productive, 80% of the revenue from selling timber goes to the community and 20% goes to DESEC. So far, the program has worked with 835 communities, which includes over 30,000 families.

When the program first started, many of the program participants had never planted pine trees before and were not sure what could be done with them. In 2002, realizing that there was no market for the timber, DESEC created Multiagro S.A., a timber company that purchases and refines logs from the communities. There is a small local market for the wood, but the company also has a deal with Fairtrade in which it exports timber to Mexico, where it's used for furniture. Multiagro uses profits to reinvest in the program.

*(continued on next page...)*



*(...Box 2.5 continued)*

With over 30 years of operation, the program has extracted 30,000 cubic meters of logs annually, which has generated total revenue of US\$4.7 million annually. The average annual income per participant family is US\$938, which is twice the traditional median family income in Bolivia. Additionally, a study in 2010 revealed that there was a 70% increase in the humidity in lands located at the foot of forests as opposed to similar slopes that did not have forests.

As with any program, DESEC has faced various challenges, including ownership (e.g. due to the long time it takes for a tree to mature, a family member may pass away, which can cloud the ownership), as well as strict regulatory restrictions on behalf of the government. However, the benefits greatly outweigh the challenges and there are still large areas of land with forest potential that DESEC sees as opportunities to create positive environmental and economic impacts for rural producers and communities.

### **Lesson 6: Diverse strategies to regenerate and maintain threatened landscapes should be adjusted for the local context and may require subsidies to encourage initial uptake.**

Chemonics International is working in a number of areas around the world to regenerate rural and agricultural landscapes, including southern Africa, Haiti and Mali. In each location, Chemonics is implementing a different strategy to address the issue of threatened landscapes. The strategies fluctuate from land-use planning and conservation agriculture in the Okavango River Basin, to tree planting and establishing cost-effective greenhouses in Haiti, to the dissemination and use of climate information in Mali (see Box 2.6).

One of the challenges Chemonics faced in each of the countries was that many farmers are hesitant to adopt new practices or technologies, especially if they have not seen them before and if they are more expensive. Therefore, when implementing the strategies, Chemonics adjusted each to the local context, making sure that the overall approach responded appropriately to the unique geographic and climatic considerations, and that the practices promoted were culturally-sensitive. This helped to gain local buy-in and ensure that the practices would be continued after the project end. In some cases, the projects also provided subsidies in order to encourage reluctant farmers to adopt a technology or practice. It was also necessary in cases where farmers were unable to access technologies or practice a new method because of lack of finance.

After seeing the benefits of the technology or practice, the idea is that farmers would make the decision to invest on their own, either using their own funds or accessing finance from a local financial institution. A crosscutting lesson learned is the importance of using subsidies to “prime the pump” to create sustainable economic incentives (typically additional income) at the individual or MSME level. Without financial incentives, it is unlikely that any effort to regenerate or maintain threatened landscapes will have long lasting impact.



### Box 2.6: Strategies to Restore and Maintain Threatened Landscapes

**Land-Use Planning in the Okavango River Basin** – Through the USAID Southern Africa Regional Environmental Program (SAREP), which focuses on the Okavango River Basin in Angola, Botswana, and Namibia, Chemonics has worked with local organizations to create a Land-Use Conflict Identification Strategy (LUCIS). The project identified optimal agricultural sites, mapped wildlife corridors, mapped alternative uses for land, and worked with land authorities to make educated decisions on land-use planning and allocation. The strategy was adopted by Botswana's Tawana Land Board for land-use planning and allocation is also being adopted by the Namibian government. The project also promoted conservation agriculture techniques, but faced slow uptake due to cultural considerations. However, once there were demonstrated benefits, such as increased yields, the project found more farmers were willing to participate.

**Stabilizing Hillsides in Haiti** – Through the USAID WINNER project, Chemonics used farmer-managed regeneration activities, such as planting trees to stabilize hillside landscapes in Haiti. Between 2010 and 2014, the project planted 34,000 acres of vulnerable land above population centers to stabilize hillsides. In addition, the project built 373 low-cost greenhouses on hillsides to protect agriculture and practice vertical agriculture. The greenhouses were the first ones ever built in the country and because they were a new concept and farmers were unable to access finance, they were subsidized. The greenhouses allowed farmers to produce crops all year round and to diversify into agricultural activities with higher returns, such as vegetables and flowers. Due to increased income, one farmer was able to get a loan from a local bank to build additional greenhouses. Currently, Chemonics is implementing the Feed the Future Chanje Lavi Plante project, which builds on the results from WINNER.

**Improving Climate Information Quality, Availability and Usage in Mali** – The Mali Climate Change Adaptation Activity, implemented by Chemonics, focuses on the rural Mopti region where rainfed agriculture is especially vulnerable to the effects of climate change. The project is working on both the demand and supply side of climate information in order to increase: 1) the use of effective climate information by vulnerable populations, 2) the inclusion of climate change considerations in governance systems, and 3) the adoption of local solutions to climate variability and change. Working with Mali Météo's climate information products concurrently while addressing farmers' barriers to access of the information will help farmers and community stakeholders to make educated decisions regarding the maintenance and/or restoration of their landscape. Currently, the project is conducting a baseline behavioral survey to see how farmers use climate information as well as identify any key social-cultural aspects that will affect the uptake of climate information in rural communities.





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Photo: C.Schubert

# Financing Environmentally Sustainable Development





There are many risks and challenges associated with financing development at scale, especially when solutions incorporate climate-smart agricultural practices and technologies. Nevertheless, there have been some promising advances, particularly, for example, in the areas of traditional and drip irrigation. The development community understands that conserving watersheds and strategically positioning irrigation channels and rainfall intervention infrastructure can help rural farmers enjoy enhanced production and more stable livelihoods. However, financing these interventions can still be a challenge due in part to large upfront costs and high perceived risks. This section focuses on several strategies that development practitioners, private sector companies, and financial institutions are implementing to overcome the challenges associated with financing environmentally sustainable development, especially in rural areas.

### **Lesson 7: Finance can be used to reduce detrimental impacts on the environment, even for crops that historically have had negative environmental effects.**

Frank Rubio, the Head of Oikocredit's Agriculture Unit, moderated a panel of palm oil producers and consumers to illustrate the ways that his organization has been able to make positive contributions to the environment by financing palm oil that is in compliance with local country environmental criteria as well as the international Roundtable on Sustainable Palm Oil (RSPO) standards. Mr. Rubio pointed out that the palm oil industry is linked to many challenges as global consumption continues to rise, including rainforest destruction and loss of biodiversity. As a social impact investor, Oikocredit saw ways to generate a large positive impact on this industry since 40% of palm oil production worldwide is generated by small farmers. Thus, by engaging these small producers, and encouraging sustainable production practices, Oikocredit was able to help the industry reduce its environmental footprint, and achieve its triple bottom line mission of focusing on people, planet, and profit. One of Oikocredit's partners, Dr. Bronner's – a manufacturer of organic soaps – has used working capital investments to scale its reach through the supply chain to not only replant more efficient hybrid varieties of palm trees, but also to directly finance farmers in local communities. Dr. Bronner's sees RSPO certification as a good first step in creating baseline standards for sourcing palm oil that is not harmful to the environment. However, the company goes beyond this certification to produce palm oil that is both certified organic and fair trade, in an effort to truly improve the livelihoods of the farmers with whom they work. In fact, over the past eight years, Dr. Bronner's has spent US\$1.2 million on community development projects, infrastructure, housing and education. By using RSPO as a baseline, small producers can leverage this certification to access financing and decrease negative environmental impacts in their industry (see Box 3.1 for an example from West Africa). As Mr. Rubio explained, "Good palm oil is sustainable palm oil."

#### **Box 3.1: Production and Trading of Certified Palm Oil in Côte d'Ivoire**

In the case of Agrivar, the only producer of RSPO-certified palm oil in Côte d'Ivoire, achieving RSPO certification allowed the company to increase its production capacity and decrease its costs. Since 2011, by incorporating the RSPO practices into each of its four linked cooperatives on 9,300 hectares of land, Agrivar has been able to reach new markets and is now exporting its certified palm oil to Europe. Furthermore, Agrivar noticed that demand for its certified palm oil is currently above its supply capacity. With recent upgrades to their processing plant in 2015, Agrivar has doubled its production capacity to 33,000 metric tons per year, and has further expanded into the production of fertilizer by using the waste from the production process. Agrivar hopes to continue growing and increasing its production capacity in partnership with Oikocredit to export greater quantities of its certified palm oil to the ready markets in Europe.



### Lesson 8: Farmers need financing for irrigation in order to be more precise with their farming techniques, to intensify their practices, to increase production and to adapt to changes in the climate.

CRS shared their experiences implementing water management methods from landscape to farm and plot level including traditional and drip irrigation schemes and approaches they have used to integrate a full range of financing and partners into scaling the models. CRS' Shaun Ferris highlighted the advantages of incorporating irrigation into farming techniques stating, "If you are relying on grain crops and rainfed agriculture, the chances of escaping poverty are extremely low." He cited the deep experiences of CRS and their understanding that farmers who managed water effectively showed the greatest long-term market progress. Eduardo Mendias of The Toro Company went on to elaborate on the benefits of incorporating irrigation as a partnership with the public sector and donor projects saying, "Monetizing gains in productivity is the key to sustainability," and further mentioned the necessity of having an off-taker to purchase any increase in production.

CRS has seen particular success in Malawi, where they have treated land in 32 watersheds using small-scale irrigation techniques such as building water absorption trenches, stone bunds, and continuous contour trenches (see Figures 6, 7 and 8, and Box 3.2). Furthermore, the talk highlighted the need to partner with financial service partners, such as Opportunity International, to facilitate access to finance for smallholder farmers to purchase drip irrigation systems from companies with expertise in farm-level irrigation technologies, such as Toro. Tim Strong enumerated the risks faced by Opportunity International in financing drip irrigation systems, such as the need for technical assistance and proper maintenance, but he further stressed the business aspects of farming: "If you invest more, you can gain more, but farmers need to know that you can also lose more, when crops fail. Agriculture is a business, and farmers must understand the business in order to benefit from technical assistance and opportunities for investment. After the project ends, the farmers need to be able to identify opportunities and assess risks without technical assistance." Voluntary uptake by farmers is another key aspect necessary for scaling and sustainability because if a farmer decides on his own to investigate market opportunities and invest in increasing production capacity, then this investment will lead to stronger results.

Figure 6: Stone Bunds



Figure 7: Continuous Contour Trench



Figure 8: Water Absorption Trench



Photo credits: CRS





### Box 3.2: USAID Food for Peace Watershed and Agriculture for Life Advancement, Malawi – 2009–2014

Under the Watershed and Agriculture for Life Advancement (WALA) program implemented in Malawi, funded by USAID's Food for Peace program, CRS built small-scale irrigation systems to help the local population increase food production, increase yields and mitigate climate shocks. During implementation of this program, Malawi faced lower and lower rainfall totals, highlighting the need for climate-smart interventions and adaptations. By engaging the community and teaching proper watershed management techniques, CRS was able to treat 2,390 hectares of land. These interventions made "falling water run, running water walk, walking water crawl, and crawling water stop" and infiltrate the soil. Through this program, CRS learned to emphasize soil and water management as a way to enhance the benefits of the rest of its technical assistance. By working with partners, such as The Toro Company and Opportunity International, CRS has helped local communities in Malawi to manage water more effectively and become more resilient to climate impacts.

### Lesson 9: Community-level social entrepreneurs can play an important role in encouraging climate-smart agricultural practices and facilitating access to finance.

NCBA CLUSA has been working in Zambia and Senegal to tackle the dual challenges presented by climate change in Africa: feeding the growing population with decreasing amounts of arable land available to produce food. Todd Crosby of NCBA CLUSA presented the evolution of a model his organization is using to overcome these challenges. What began as support for private sector-linked agro-dealers under the USAID-funded Zambia PROFIT I project, transitioned into community-level agro-dealers, who supported a wider variety of climate-smart agriculture products and services under the USAID-funded Yaajeende Nutrition Led Agriculture project in Senegal. This transition increased agent incomes and helped them to be more responsive to local smallholder needs. Today, these community-level agro-dealers have evolved into independent franchisees of an organization called CultiVert. CultiVert now provides 800,000 people access to a broad range of products and services including high-yielding crop varieties, short-cycle and bio-fortified crops, climate adapted technologies, livestock, nutritional products, products for hygiene and sanitation, as well as business development services, insurance, and credit facilitation. In this current model, the community-based agents have the opportunity to specialize in an area such as nutrition or business advising and to act as their own independent company offering enterprise solutions in these sectors. The development of these local autonomous franchisees shows an evolution towards promoting the emergence of a local private sector focused on "mission, not just money" and "solutions, not just sales." NCBA CLUSA has been investing in developing trainings and curricula for these social entrepreneurs, which has been central to their evolution. These agents are resolving climate-related issues for their communities as members of their communities, and thus the adoption of resilient practices has been highly successful at the local level.

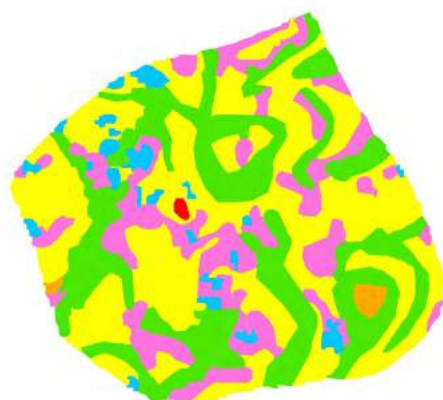
### Lesson 10: Local community participation is important when financing micro-watershed projects that help to conserve soil and water resources.

Satish Pillarisetti of Sa-Dhan – an association of community development finance institutions in India – presented the unique approach taken up by his previous organization, India's National Bank for Agriculture and Rural Development (NABARD), to conserve watersheds in arid regions of India. From the outset, Mr. Pillarisetti stated that it is crucial for communities to participate in watershed development projects in India if they are to succeed. Frequently, Government of India programs fully fund and complete watershed improvement projects without including the community in the planning or maintenance process. These projects continually fall into disuse and ruin as a result. In partnership with a number of institutions, NABARD has been able to implement a successful model of micro-watershed development that has created adequate and sustainable



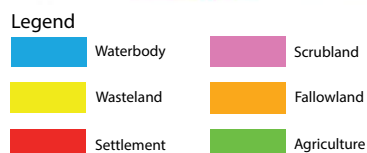
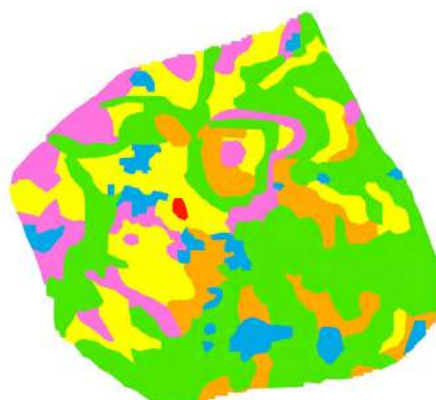
livelihoods for the inhabitants of arid regions. The process is broken into three general phases: 1) Planning Phase (100% funded by NABARD), 2) Capacity Building Phase (75% funded), and 3) Implementation Phase (25% funded). In the Planning Phase, NABARD allows communities to self-select the micro-watershed project to be put in place, and an agreement is reached to contribute voluntary labor from those who will benefit. In the Capacity Building Phase, and in partnership with a local NGO (responsible for motivating and mobilizing the community), NABARD builds the technical skills of a new Village Watershed Committee to take control of the project after it is completed. And in the Implementation Phase, the project is constructed and handed over to the Committee. NABARD offers lower interest rates for these projects than a typical commercial financial institution and works with local banks to facilitate credit once the project is complete. To-date, this approach has financed two million hectares of farmland across India for an average cost of \$148/ha, resulting in improved soil and water retention, crop diversification in tune with local natural resources, and more resilient populations. The geographic information system (GIS) images below are from the impact evaluation of the Ambewadi watershed, just outside Mumbai in western India, and illustrate the powerful effect these micro-watershed projects can have on local communities (see Figures 9 and 10).

**Figure 9: Ambewadi Watershed  
Pre-Intervention, March 2001**



Source: IRS 1C/1D/P6, LISS III (MARCH-2001)

**Figure 10: Ambewadi Watershed  
Post-Intervention, April 2008**



Source: IRS 1C/1D/P6, LISS III (APRIL-2008)

### **Lesson 11: Agricultural insurance can help to reduce risks and smooth income variability, reducing the potential for catastrophic impacts related to climate change.**

In the central and southern regions of Senegal, farmer livelihoods are highly sensitive to fluctuating weather conditions and access to water (80% of planted area is rainfed). Furthermore, smallholder farmers have limited access to finance, and price volatility causes them to adopt low-revenue and low-risk strategies to adapt, trapping them in a subsistence-driven cycle. Financial institutions are typically reluctant to lend to smallholders due to their general lack of collateral and the high risk of lending for inputs. Engility's USAID-funded Projet Croissance Economique (PCE) project and its follow-on Feed the Future



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Naatal Mbay project in Senegal have worked on ameliorating these challenges by integrating insurance premiums into cash flow-based seasonal loan payments for cereal farmers (rain-fed rice, maize and millet), which has quickly scaled from 24 policies purchased in 2012 to 3,087 insurance policies covering 3,945 hectares in 2015. is needed.

In Engility's model, solutions are based on a multi-risk reduction strategy, which allows financial institutions to overcome asymmetrical information and risk barriers. In the typical case, producer groups create sales contracts with local traders and processors, which act as collateral substitutes in their credit application. Input suppliers then provide inputs to the associations and get paid by the bank based on delivery forms approved by the producer groups. The groups then distribute inputs to their members who then reimburse in kind at harvest time. Warehouse receipt financing is also available to producer groups to allow further flexibility once the harvest is ready. Furthermore, Engility's projects have worked to embed agricultural insurance into the lending products that is based on crop-specific indices and broken out by zone and rainfall requirements. The added insurance costs the farmer 4.5% to 16% of their insured capital depending on the rainfall risk in their specific zone and value chain (these premiums include a 50% government subsidy). By setting up these risk-sharing partnerships and embedding insurance into the financial package, the overall risk borne by the financial institutions is decreased, which allows for easier facilitation of credit. While this methodology is not completely sustainable at this time due to the presence of subsidies, Engility is quickly scaling the project, which will allow the premiums to decrease and the subsidy to be eliminated over time.

At the end of the day, Mamadou Diop – a Finance and Investment Advisor for Engility – stated that projects should “treat farmers as businesses.” If an initiative will make their activities more profitable, the farmers will likely be interested. He warned participants to not treat small farmers as poor people, but to treat them as small business owners in order to truly have interventions take hold.



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Photo: C.Schubert

# Encouraging Investment in Climate-Smart Agriculture



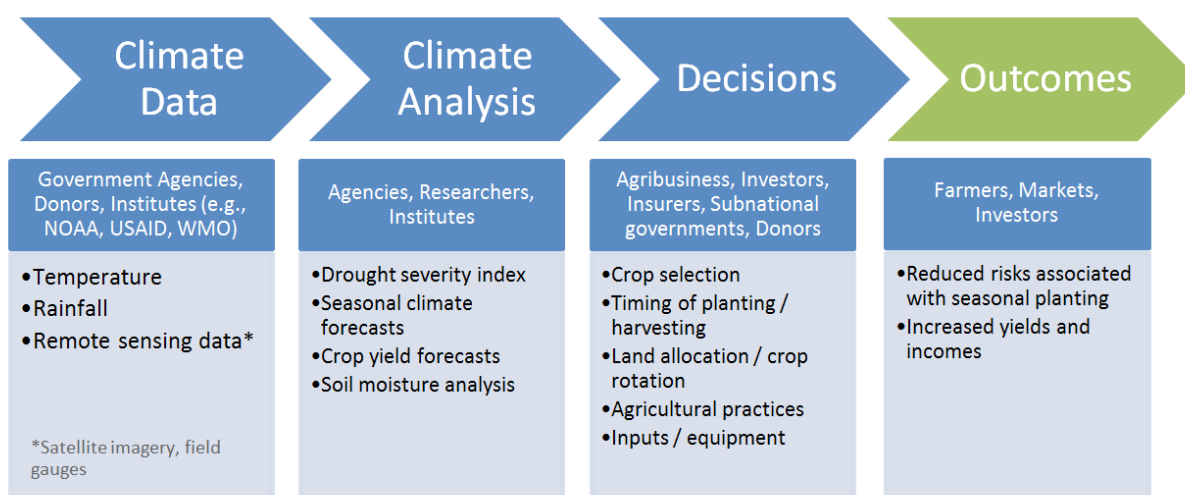


In addition to debt financing, investments in climate-smart agriculture can take the form of public goods in climate information services or knowledge enhancement, as well as public-private partnerships and long-term investments in training and agricultural risk reduction, such as through guarantees and other enhancements. This section explores some of the broader ways that climate-smart investments take place and the role that they can play in encouraging smallholder uptake of climate-smart agricultural practices.

## Lesson 12: Climate services can help to reduce uncertainty and improve predictability through accurate seasonal forecasts, which is needed to encourage farmers to invest in climate-smart agriculture practices, such as in new seeds and technologies.

Climate services can be used to provide information to farmers about long-term weather patterns and trends. As Michael E. Cote of Engility explained, “Climate is what you expect; weather is what you get.” In theory, with climate services, such as those on the US Drought Portal at [www.drought.gov](http://www.drought.gov)<sup>5</sup>, one can make better investment decisions and improve investment outcomes. As a result of climate change as well as natural weather variability, Engility uses a combination of hydro-meteorological climate services to reduce uncertainty in agricultural production, as highlighted in Table 4.1 and applied in Kazakhstan (see Box 4.1). These and other Engility experiences contributed to the book, *Valuing Weather and Climate: Economic Assessment of Meteorological and Hydrological Services*, a joint effort of the Climate Services Partnership Working Group on Valuing Climate Services, with USAID, the World Bank and the World Meteorological Organization.<sup>6</sup> Nonetheless, the world of climate services is still relatively new, more and deeper evaluations are needed, such as to address issues of trust when the information is government provided and who is responsible for bad decisions as a result of faulty data or inaccurate forecasts. In an ideal world, climate services can be provided as a public good to be used to create immediate positive impacts associated with the next production cycle.

Figure 11: Use of Climate Data and Analysis to Improve Investment Decisions and Outcomes



<sup>5</sup> See [www.drought.gov](http://www.drought.gov), which links 177 agencies and their climate data for US monitoring purposes.

<sup>6</sup> <http://www.gfdrr.org/sites/default/files/publication/SEB%20HYDROMET.pdf>



### Box 4.1: Using Climate Services to Improve Planning and Investment in Kazakhstan

Engility uses a variety of climate services and tools to improve agricultural forecasting, including easy-to-use precipitation and drought forecasting indices, as well as staff trainings and software. In Kazakhstan, for example, Engility climate specialists provided technical assistance to the Climate Resilient Wheat Integration Pilot implemented by the United Nations Development Programme (UNDP) and in collaboration with USAID's Central Asia Republics' mission. The objective of the project was to increase food security for Central Asia by improving the resilience of Kazakhstan's wheat sector to climate change and to enhance regional awareness and understanding of the implications of climate variability and long-term climate change on wheat production.

Upon arrival, the team found that the Government of Kazakhstan had a lot of data on seasonal temperatures and precipitation, but it had not been fully analyzed and disseminated in a way that was useful. In general, agricultural extension services and training were lacking. Therefore, Engility developed a platform to analyze the data and to create seasonal climate and crop forecasts. Engility then used the yield forecast data to train Government extension workers and farmers on how to use the information for improved crop selection, rotation and land allocation, as well as to make better climate adaptation decisions. One decision was to gradually move farmers away from the mono-crop culture of wheat, toward improved soil management including no-till and low-till climate-smart agricultural practices. Engility also encouraged investment in organic oil seeds, which were in high demand from Scandinavian markets. Kazakhstan was ideal for organic production, as it was nearly devoid of pests. The Engility team also provided assistance in creating drought indices to improve weather and climate forecasting capabilities, and facilitated "Training of Trainer" workshops for extension services employees on climate adaptation and climate services. To ensure long-term sustainability, Engility trained farmers and other local stakeholders to conduct analysis and provide information on the various types of climate impacts, helping them to determine non-climate stressors, ranking the most important problems facing farmers in order of priority, and identifying options for reducing vulnerability to climate change and variability.

### Lesson 13: Public-private partnerships (PPPs) can be powerful tools in promoting climate-smart agriculture and restoring the natural environment.

In a session co-presented by SNV, USAID and the International Food Policy Research Institute (IFPRI), Eelco Baan of SNV presented several examples of sustainable climate-smart investments made in partnership with the private sector, emphasizing the dual focus of SNV's climate-smart investment model: maximizing economic as well as social benefits. SNV works at all three levels of the investment environment: 1) at the landscape level, to work across industries to achieve scale; 2) at the supply chain level, to ensure inclusive business practices; and 3) at the local level to find the most comprehensive business models and sustainable approaches to implementation. In each of its projects, SNV focuses on identifying gaps in the market, proposing market-based solutions, identifying clear, commercially viable business cases, and leveraging private-sector investment (see Box 4.2 for an example). Through its Mangroves and Markets project in Vietnam, SNV illustrated how successful PPPs can simultaneously improve income for smallholders and reverse harmful environmental trends.



### Box 4.2: SNV Facilitates Climate-Smart Investment in Shrimp Farms in Vietnam

Ca Mau Province in the Southern-most tip of Vietnam is home to half of the country's mangroves. Shrimp aquaculture is an important source of livelihoods in this province, yet this livelihood is simultaneously the leading driver of mangrove deforestation. More than half of Vietnam's natural mangrove forests have been cleared to accommodate shrimp ponds over the past three decades. Mangrove forests are critical to livelihoods, including shrimp farming, and landscapes in Ca Mau province because they serve as protection from erosion, floods, and storm surges, and act as carbon sinks. Mangrove health and shrimp profitability are linked because mangrove depletion leads to erosion and saltwater intrusion, which causes diseased and unhealthy shrimp, decreased returns for farmers over time, and eventually abandoned shrimp ponds.

SNV has worked to reverse the deforestation trend by incentivizing and empowering smallholder shrimp farmers to meet organic certification standards, which command a higher price on the international market from consumers. Naturland organic certification prohibits mangrove deforestation and requires a 50 percent mangrove cover on shrimp farms. To meet this certification, shrimp farmers who once cleared mangroves for shrimp ponds are now leading mangrove protection and restoration. To incentivize farmers to achieve certification, SNV has established a public-private partnership with Minh Phu Seafood Corporation, shrimp farmers, and the local government. Minh Phu Seafood Corporation buys all certified organic shrimp produced by farmers within the project at a 10% price premium and pays certified farms an additional amount per hectare, per year. The Nhung Mien Forest Management Board (local governance) helps shrimp farmers develop environmental management plans in line with organic certification. SNV provides training to shrimp farmers and supports Minh Phu's access to international organic markets in Europe and the United States.

By bringing together the focus on economic as well as social benefits, and by working across all levels of the investment landscape, SNV has been able to reverse harmful deforestation trends, while raising farmers' incomes and contributing to more stable livelihoods.

### Lesson 14: Investing in gender-sensitive agricultural technologies can be used to economically empower women by increasing income and reducing labor time, as well as boosting agricultural yield, eliminating food waste and improving food security.

According to the Women in Agriculture report by the Food and Agriculture Organization (FAO), women in agriculture have one thing in common across all regions – they have less access than men to productive resources and opportunities. The gender gap exists for many assets, inputs and services, including land, livestock, labor, education, extension and financial services, and technology. This gap imposes costs not only on women themselves, but on the agricultural sector as a whole. FAO estimates that if women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent. The African Women in Technology (AWIT) initiative was launched at the World Economic Forum in June 2015 to promote up-scaling of rural technologies for women (see Box 4.3). The initiative promotes inclusion of women in the design as well as the prototyping stage of developing, disseminating and utilization of the technology. This means that the women's participation will guide the generation of appropriate designs and approaches to address their technological needs, resources and enhance their use of the technologies. For example, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) had to improve its treadle pump prototype several times with the help of women farmer innovator groups before the pump became user-friendly for women. Now the treadle pump is a simple, low-cost, gender-sensitive irrigation technology that helps women water their crops as well as their livestock.



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Women's concerns also need to be kept in mind to ensure technology adoption. For example, Embean 14, popularly known as the 'wonder bean,' not only yields more than 2 times the traditional variety, but also cooks very fast, thereby reducing the amount of firewood and the labor involved in cooking. As women are the primary food makers, they greatly appreciate this fast cooking variety and adopted the new seed. This variety also matures in 90 days and does not require a lot of rain, so it is more climate resilient. In Malawi, UN Women and Total Land Care have been popularizing the Rocket Stove which is being built in rural communities throughout Malawi. The stove allows the cook to use approximately 50% less fuel and costs about \$5 to \$6.

AWIT's programs reveal that women innovator groups can quickly identify, propose and design improved labor-saving agricultural tools and processing technologies. Rapid prototyping of tools, using on-farm trials with women innovator groups, leads to tools that are gender sensitive and have a high likelihood of adoption.

### Box 4.3: African Women in Technology (AWIT)

Through the African Women in Technology (AWIT) initiative, UN Women is establishing a global alliance to promote upscaling of rural technologies for women. This initiative is generating data and connecting both public and private sector organizations, such as Bell Industries, Equity Group Funds, GROOTS Kenya, Grow Africa, Kopernik and TechnoServe. The initiative provides a platform for the exchange of lessons learned and good practices. It is facilitating the connections between technology innovators, researchers, investor and other market actors, such as distributors, industrialists, and community mobilizers to the end users especially the women.

The ultimate goal of AWIT is for women to have access to technologies that boost agricultural yield, income and food security, while decreasing their labor inputs and time, and thereby empowering women economically. The initiative is expected to reach five million women with affordable technology solutions by the end of 2018, reducing food losses by 30 percent.

### Lesson 15: A bottom-up approach is needed to encourage investment in climate-smart agriculture, beginning with resiliency training and ensuring that agricultural cooperatives have an active role in determining and implementing the strategy.

In the Sertão Region of Brazil, Adapta Sertão, a coalition of Brazilian organizations, including SENAR (National Service for Rural Learning), the Brazilian Confederation of Agriculture and Livestock and the Inter-American Development Bank, has been working with six agricultural cooperatives to design and implement a climate-smart agricultural production system called MAIS (Modulo Agroclimatico Inteligente e Sustentavel), as described in Box 4.4.

Climate resilience is built through eight pillars divided into three major steps:

1. The first step links (i) a climate resilient production system to a (ii) credit mechanism and to a (iii) capacity building and technical assistance program focused on the climate resilient system. The integration of these three aspects (climate resilient production system – credit – technical capacity/assistance) represents the “structural step” because it is built on the three pillars that make farmers more climate resilient.
2. The second step consists in making the value change resilient to climate by (iv) strengthening the local productive institutions (cooperatives, associations and local private actors), (v) aggregating value to the farmers' products through local agro-industries and (vi) increasing farmers' access to market. These three additional steps need to have a focus also





on climate. Some examples include the processing of drought resistant fruits or training the cooperatives' management team on value chain exposure to crop loss due to climate shocks.

3. The third step is the institutionalization of the whole value chain through (vii) public policies and (viii) research programs that feed into the policy making mechanism.

These eight pillars must be developed in partnership with all key actors to ensure that policy decisions are taken through “bottom-up” approaches that make policies suitable and viable for that specific local conditions.

### Box 4.4: The MAIS Approach in the Sertão Region of Brazil



The Sertão Region of northeastern Brazil is one of the poorest and most vulnerable to climate change. Between 1962 and 2012, average temperatures have increased by 1.75 degrees Celsius and average rainfall has decreased by 340 mm, resulting in increasing drought conditions and declining agricultural productivity. As a state that has been largely dependent on dairy farming, with potential loss in milk productivity by 3–7kg/day/cow if temperatures increase an additional 2°C in the State of Bahia (see graphic).

To address this issue, Adapta Sertão worked with six agricultural cooperatives to design and implement a climate-smart agricultural production system called MAIS. The MAIS is disseminated through technical assistance by SENAR and access to credit through a pilot fund managed by the national banks. The system organizes farmers around three production lines (milk, meat and fruit) and includes reforestation and sustainable forest management as transversal areas of action. The MAIS package includes irrigation, storage, product processing technologies and others. The Adapta Sertão strategy is holistic in that it relies on:

- a climate-smart approach to agricultural production and livestock management;
- credit to fund the system through partnerships with microfinance institutions;
- a continuous technical assistance program to train and monitor how farmers use the system;
- a well-managed cooperative to organize the work of the farmers;
- small agro-industries to aggregate and add value to the farmers' products; and
- a commercialization strategy and ready market to purchase the farmers' products.

To be effective, cooperatives need to generate sufficient revenues to ensure that qualified professionals are involved in the management and maintenance. The MAIS approach was designed to guarantee at least two minimum salaries per month per farmer (approximately US\$450), sufficient to lift farmers out of poverty. While the objective is to reach 700 farmers by 2018, 360 farmers are already being trained on the MAIS system as of March 2016. As the project scales up, an increasing emphasis will be placed on research and development to document the results, as well as on public policies to support its expanded application. With an anticipated return on investment of 10%, the Sertão project is demonstrating that climate adaptation and resilience represents a significant business opportunity for the State of Bahia and its 800,000 farmers.



### Lesson 16: To encourage climate-smart agriculture, approaches and investments need to be accessible and affordable, and help farmers reduce risk

This was the approach used by SNV to tackle climate change impacts and improve resilience of the apple value chain in Nepal. Box 4.5 describes how SNV's Nepali Climate-Smart Agriculture Consultant, Shankar Bhattarai, worked with traders and farmers to identify a solution to the lack of water (and soil moisture) needed to ensure high quality, consistent production. Irrigation was not economically feasible, as it required investments in lifting systems. Snow harvesting was the solution identified, including water use efficiency, eco-friendly agronomic practices and financing through local banks (bundled with crop insurance). As a result, survival rates of transplanted seedlings improved from 50% to 95% over the three year life of the project. In addition to increasing production by 2.6 times, the apples were better quality (Superior+A Grade apples increased from 64% to 77% of all production) as irrigated apples were larger, had fewer blemishes and better color.

#### Box 4.5: Snow-harvesting in Nepal Saves Apple Value Chain

The negative impacts of climate change are becoming increasingly apparent in Nepal, where average temperature has risen 0.6°C in past decade. Impacts are even more pronounced in higher altitudes, resulting in shorter winters with more snow melting causing increased landslides and flooding, debris flow and soil erosion, followed by less water in summer. In the Jumla district of Nepal, there was increasing evidence of the negative effects of climate change in apple growing areas. Even though the amount of rainfall remained similar, the relative soil humidity dropped due to fewer but longer rainy days, resulting in run offs and dry spells. This lower humidity caused deteriorating quality and quantity of apples, as well as increased attacks by woolly aphids. While demand for apples exceeded supply in Nepal, with large apple imports from China and India, poorly arranged production systems for apples was a deterrent to farmer investment.



Photo credit: SNV

As highlighted in the graphic below, SNV followed a three part process, including:

1. **Vulnerability assessment and scenario mapping.** In the first year, SNV began with an analysis of the climatic variations and impact on the apple value chain; they identified and ranked the problems according to severity and immediacy of impact. This step included a participatory rural appraisal, secondary data analysis and a literature review.
2. **Preparation of climate-smart agriculture (CSA) pool of stakeholders.** By year two, SNV had identified the main culprits of the problems impacting the apple value chain, for which included the greatest issue was the lack of and variability of soil moisture over the production cycle. SNV organized multiple stakeholder meetings, including representatives of the public and private sectors to review the evidence and come up with potential solutions.

*(continued on next page...)*



(...Box 4.5 continued)

- 3. Field testing of potential solutions and fine tuning.** In year three, SNV field tested a package of technical solutions, including irrigation from snow harvesting and trainings to improve water use efficiency and eco-friendly practices. Through trial and error, SNV found that most cost-effective solution relied on cement bags to line small ponds for storing snow in the winter, which would be used to irrigate the apple orchards during dry periods. With a capacity of up to 15,000 liters of water (enough to irrigate 60 apple trees each), these ponds only cost farmers US\$200-US\$250 each and are expected to last for 10-15 years. SNV found that by combining frequent small doses of irrigation during the critical period of February to May along with thick mulching to retain moisture in soil (peat moss), apple production quantity and quality improved substantially. SNV promoted this cost-effective approach through a network of lead farmers' telephones and over the FM radio, through which they shared information on weather forecasts, irrigation times, application methods and important agronomic practices. Through these venues, they taught farmers how to measure and monitor soil moisture so they would know when irrigation was needed.

While the project ended in November 2015, there were significant signs of uptake in the Jumla region, where SNV had facilitated the following results:

- Strengthened CSA practices of 616 farmers, who followed SNV's adaptation guidelines, with 150 farmers installing snow harvesting ponds in Jumla. Demonstrated that this cost-effective approach could help to increase production and improve apple quality, creating a return on investment for the farmer of 2.37 times.
- Improved business relationships through 30 clusters of value chain actors, including written contracts with embedded services related to harvesting and packaging provided by apple buyers to ensure their supply of quality apples needed to meet demand.
- Facilitated the organic certification for all products in the Jumla district and supported the creation of a processing plant to make apple wine, locally owned and linked farmers to market for bruised apples.

Mr. Bhattarai credits this project's success largely to the inclusive approach used from the beginning to engage local stakeholders, but linked to Nepal's national planning process as well. The approach is now being replicated through local NGOs in partnership with municipal and national plans. For example, the Ministry of Agriculture is now involved with helping to resolve the lack of finance for farmers, by providing smart subsidies for crop insurance and loans to farmers.



Photo credit: SNV



### **Lesson 17: Diversification of investments at the farm as well as household level can increase agricultural yields, income and nutrition.**

A climate-smart, holistic approach to working with coffee farmers can increase their coffee yields and income as well as increase food security and nutrition. A holistic approach can rely on investing in a variety of climate-smart techniques, such as soil restoration, soil water management, inter-cropping, stumping, grafting and agroforestry, as well as alternative income generating activities. Coffee farmers the world over are suffering from the impacts of climate change. With climate change, Arabica coffee is becoming less suited for lower altitudes with abnormalities in tree growth and premature cherry ripening. Incidence and severity of pests and diseases are increasing, including leaf miners, coffee berry borer and coffee leaf rust. Heavy rains, hail, strong winds and floods are all taking their toll on coffee trees as well as leading to soil erosion. Prolonged rain is reducing flowering and growth and the increased humidity favors fungal diseases. On the other hand, prolonged drought is threatening Robusta coffee trees, increasing mortality of young trees, and giving low and poor quality yields.

The Keurig Green Mountain (KGM) Diversifying Livelihoods project implemented by CRS in East Africa between 2010-2015, helped farmers to improve and protect their soil, ground cover and natural habitats. As a result of the adopted climate-smart strategies and increased access to finance, farmers were able to increase their coffee yields, as well as improve coffee quality and resilience to climate change impacts. In particular, the use of bio-intensive agricultural techniques for soil fertility and erosion control, and improved soil water management mitigated the impact of droughts and increased coffee yields in Kenya, Rwanda and Ethiopia. CRS also trained coffee washing stations to process coffee pulps into organic fertilizers (compost manure) for improving coffee yields and quality, and to properly manage coffee processing waste water for reducing environmental pollution.

The KGM project focused not only on improving coffee production but also on creating and strengthening other sources of income for coffee farmers, so that they would have steady cash flow throughout the year. The CRS approach combined agricultural and entrepreneurial technical assistance with finance through its Savings and Internal Lending Communities (SILCs), so that farmers were able to access financial resources to upgrade their farms, invest in assets and diversify their income. See Box 4.6 for more details and results.

#### **Box 4.6: Keurig Green Mountain Invests in Climate-Smart Agriculture for Coffee in East Africa**

Keurig Green Mountain's five--year project with Catholic Relief Services had three major interventions – 1) train coffee farmers on climate-smart agricultural practices; 2) promote income generating activities, such as livestock farming to diversify livelihoods and improve year-round food security; and 3) promote savings and internal lending communities (SILC) to increase access to financial services.

To increase coffee yields and quality, farmers were trained in good agricultural practices. This included bio-intensive agricultural techniques, such as mulching, pruning, composting animal dung, other organic matter and coffee pulp, and integrated pest management. Farmers practiced stumping and grafting to gradually replace old coffee trees with new improved varieties. Farmers also engaged in group-based coffee seedling production and sales.

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(...Box 4.6 continued)

Farmers were taught to diversify their farm enterprises and grow better coffee through agroforestry and multi-layering of trees using shade trees, legumes, spice plants and tubers. In Rwanda, farmers planted *Grevillea* for shade trees and wind break, which help to reduce temperatures and soil erosion on the sloppy hills. In Kenya, beans and bananas were inter-cropped to fix nitrogen and improve soil fertility and provide shade for coffee. In Ethiopia, farmers inter-cropped coffee with enset (false banana) which is a food crop. They also used multi-layering and grew spices, such as ginger, cardamom and garlic, as well as cassava, roots and tubers. By growing other crops, farmers diversified their farm incomes, grew better coffee, evened out their cash flow, and improved household food security.

The project also helped farmers increase their incomes and self-sufficiency by helping them to start other income generating activities like keeping livestock. In Kenya, the farmers were given dairy goats and in Rwanda, the farmers were given small livestock, such as goats and pigs. In Ethiopia, farmers were trained on how to improve the quality of the feed for fattening oxen, and they accessed financial services to fatten oxen and rear sheep. Ethiopian farmers were also given loans to start beekeeping. The livestock helped with a source of organic manure to increase soil fertility and also increased dietary diversity of the family.

In addition to the agricultural technical trainings, farmers learned savings and financial management through SILC, a methodology that creates village level savings and credit groups. In this model, each group (predominantly women) meets regularly and every member commits to saving at each meeting. The group then provides loans to group members on a rotating basis. Once a year, the earnings on the interest of the loans are paid back out to the members. The farmers used these loans to invest in income generating activities and to build assets.

**Table 1: Results of Keurig Green Mountain: Diversifying Livelihoods for Smallholder Coffee Farmers Project**

	Rwanda	Kenya	Ethiopia
Number of farmers	3,276	1,477	2,814
Average yield increase	1.5 · 4 kg/tree	0.9 · 1.5 kg/tree	3.5 · 5.5 kg/tree
Household food security improvement	7.3 · 9.9 months in a year	6 · 10 months in a year	7.7 · 10.3 months in a year
Dietary diversity score improvement	2.9 to 4.5	NA	3.8 to 4.5
Cummulative internal savings of SILCs	\$54,868	\$109,012	\$152,104





### **Lesson 18: To encourage rapid uptake of climate-smart technologies, smallholders often need additional assistance.**

Given the severity of climate change, the United States issued an Executive Order in 2014 mandating that climate-smart approaches be integrated into all of USAID's development work to ensure its investments have a positive lasting impact. Dr. Noel Gurwick of USAID's Office of Climate Change explained that while many countries are making agreements to commit resources to protect the environment, such as through the \$10 billion Green Climate Fund, some estimate that as much as US\$5-7 trillion of finance will be needed by 2020 to address these challenges. This level of investment will require creative partnerships between the public and private sector, especially to stimulate smallholder investments in climate-smart agriculture. Gilad Millo of Balton Group, which is a \$200 million conglomerate of eight companies that supply agricultural inputs and equipment across Africa, explained that one of the greatest limitations to stimulating smallholder investment comes from farmers' short-term "survivalist" perspectives. As he explained, most farmers in Africa live "hand to mouth," and women farmers often have to choose between paying school fees and feeding their children an extra meal, making it difficult to convince them that their lives could improve by investing in drought-resistant seeds or drip irrigation. From Mr. Millo's experience, even after a farmer has seen the benefits of higher production hybrid seeds, that same farmer is likely to purchase only a small amount of improved seeds for the next season while planting most of the land with traditional low-cost seeds. Despite proof of rapid returns on investment through Balton Group's small-scale farmer kit, which includes drip irrigation, technical assistance, and training, smallholder uptake has been very slow. Balton has seen the best uptake of new technology by youth groups who benefited from a government-subsidized program, making the technology more affordable and accessible.

Similarly, Afgri, an agricultural equipment dealer for John Deere, was unable to get farmers to invest in tractors in Ghana, despite their ability to increase agricultural production and efficiency. Afgri's Gerrie Jordaan explained that it was difficult for farmers to get finance for the equipment and bank rates were very high (35% per year). In 2015, however, USAID's Financing Ghanaian Agriculture Project helped Afgri to link to new financial institutions, including Sinapi Aba Savings and Loans, which now facilitates financial leasing for the equipment. This financial product "has changed our business entirely" as smallholders can now afford this technology, which can double their crop production and increase their incomes.

Ben Schmerler of Root Capital, a non-profit impact investor with a mission to grow rural prosperity, described how difficult it has been to get coffee farmers in Guatemala to reinvest in their coffee farms. In the past three years, the Guatemalan coffee federation reports 1.7 million jobs have been lost due to the coffee rust disease, which is causing farmers to abandon their coffee lands. While Root Capital designed an appropriate longer-term financial product with a grace period to support coffee renovation, it has still been "a hard sell" to get farmers to make the investment to replant and renovate their coffee farms, including the additional inputs and labor required to meet Starbucks' certification. Fortunately, Root Capital has recently negotiated grant support from USAID's Bureau of Food Security to cover some of the technical assistance and risks associated with serving the smallholder market (especially for loans under \$500,000).

This panel of experts highlighted the need for additional assistance from both public and private sector organizations to encourage smallholder farmers to rapidly uptake climate-smart technologies.



## Moving Forward

**T**he Cracking the Nut 2016 conference highlighted a number of viable and sustainable approaches to regenerate rural and agricultural development in a way that is climate-smart. This learning event went further than Cracking the Nut 2015, which focused on expanding rural and agricultural markets amid climate change, by emphasizing the need for rural and agricultural development efforts to contribute to the rebuilding of our natural ecosystems. The conference reiterated the importance of applying a holistic approach based on climate-smart agricultural techniques, including soil restoration, soil water management, inter-cropping, and agroforestry, as well as the need for finance, investment and partnership between public and private sector stakeholders. As the IDB plenary panel highlighted, many large agribusinesses are already starting to move in this direction, as they recognize that there are common human objectives of food production and protection of the environment (see Box 5.1).

### **Box 5.1: Applying a Landscape Management Approach for Agricultural Development**

Large agribusinesses are increasingly partnering with NGOs and others to apply landscape management approaches. As Eduardo Bastos of Dow Chemicals explained, private companies are interested in profits, but long-term profits require sustainability. Below are a few examples of how these forward-looking companies are implementing landscape approaches in their work.

**Dow Chemicals:** From 2015 to 2025, Dow's focus is moving from creating a global "handprint," helping others to improve processes and reduce waste through external partnerships toward creating a global "blueprint," which focuses on strengthening entire value chains to create more solutions for the world and broader impact. For example, they have a partnership with the Nature Conservancy, which helped Dow decide to invest \$10 million to restore a marsh in Texas rather than install a water treatment plant (which costs \$45 million), creating savings of \$35 million while restoring the natural environment through "green infrastructure."

**The Nature Conservancy:** Maria Martinez Murillo described how they work with the private sector to better manage ecosystems, to improve productivity and community livelihoods, while ensuring long-term conservation using satellite images and science-based tools to monitor environmental impacts.

**ECOM Agroindustrial Corp Ltd.:** Leo Vasquez explained that his organization works closely with smallholders to ensure water and resource conservation up the value chain, which can include more resilient plants and climate-smart agricultural practices. For example, ECOM's agronomists promote modern practices with farmers that can help double their yields and substantially increase profits, while protecting the environment, which also makes farming more attractive to youth.

More research and investment is needed on how to sustainably support climate change adaptation strategies and yet the majority of actual investments to date, including in renewable technologies, clean energy and carbon sequestration, have been related to climate change mitigation. Perhaps we should take a closer look at how these investments have been made in urban areas to extract additional lessons that can be applied to rural and agricultural climate change strategies? As global population is exploding, more and more people are migrating to cities and urban areas. As a result, a growing proportion of the food insecure live in urban areas, where resources are increasingly stretched.



## Cracking the Nut 2016: Regenerating Rural and Agricultural Development

► Regenerating Rural and Agricultural Landscapes

► Financing Environmentally Sustainable Development

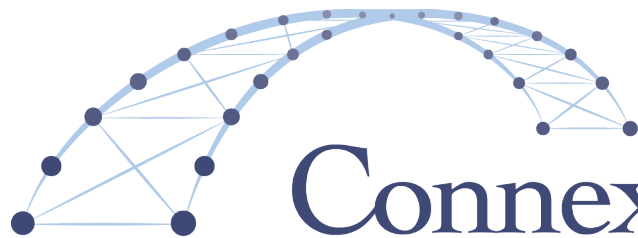
► Encouraging Investment in Climate-Smart Agriculture

Some potential future topics for Cracking the Nut include:

- Applying renewable and clean energy technologies to climate-smart agriculture;
- Improving sustainability and food security of the urban poor;
- Creating an enabling environment for urban agriculture;
- Promoting green finance; and
- Facilitating links between rural and urban supply chains.

While past Cracking the Nut conferences have primarily focused on rural and agricultural development, Connexus is now exploring applications of the knowledge sharing platform to crack the “tough nuts” associated with other development problems. For example, Connexus’ next Cracking the Nut event will focus on “The Role of Communities in Building Resilient Health Systems.” Scheduled to take place in Washington, D.C. on July 18-19, 2016, this conference will look at what it will take to transform how we design global health interventions and channel investments to build resilient health systems that are responsive to communities and clients. With the rapid pace of technological, scientific, socio-demographic change, there are opportunities for unheralded achievements in health as well as unforeseen potential disruptions that threaten the ability of communities and health systems to adapt and thrive. The Cracking the Nut Health conference aims to support the ambitious targets set out in the Sustainable Development Goals, by improving knowledge and investments in health that create synergies among people, communities and health systems to promote resilience in developing countries. For more information and a detailed agenda, please visit [www.crackingthenuthealth.com](http://www.crackingthenuthealth.com).





Connexus

[www.connexuscorporation.com](http://www.connexuscorporation.com)

[info@connexus.email](mailto:info@connexus.email)