



## 3.2 Smallholders switch to climate-smart coffee

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### Introduction

If you're reading this article over a cup of coffee, you're holding an increasingly rare commodity in your hands. The demand for coffee worldwide has outstripped supply for the last three years (ICO 2016), bringing global stocks to a five-year low. Global demand continues to rise by 1.4% per year, while yield levels have stagnated or declined in most coffee-producing countries. According to some projections, coffee production in Central America could fall by 34% by 2020.

There are various causes of this decline, including ageing trees and the spread of the coffee rust fungus (*Hemileia vastatrix*), which are worsened by the impacts of climate change. Annual rainfall in Colombia has been 40% higher than average since 2009; this coincides with a fall in production, from 11.5 million 12-kg bags in 2008 to 7.8 million bags in 2009, before recovering slightly in 2010 to 8.9 million (Thorpe and Fennell 2012). As temperatures rise, high-altitude areas that were previously too cool become ideally suited for growing coffee, but most of these areas are covered in trees. The risk is that coffee farmers will end up contributing to deforestation and in so doing they will exacerbate the problems brought by climate change that forced them to stake out new land in the first place.



SOLIDARIDAD'S CLIMATE-SMART  
COFFEE STRATEGY IS COMBATTING  
DEFORESTATION BY INCREASING  
SMALLHOLDER'S YIELDS.

### A possible solution?

Solidaridad is an international network organization and a front-runner in sustainable economic development. Its Climate Smart Coffee strategy aims to break the vicious cycle described above by helping farmers to increase yields on existing coffee fields. The rationale is that if farmers can produce more coffee from their fields, they would not need to expand into forested areas. The business case for farmers is clear, and this solution is legal.

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Certification schemes prohibit farmers from clearing forests for coffee, so if their incomes fall significantly there is a risk that they will abandon certification altogether. Solidaridad takes the view that making existing plantations more profitable — combined with social pressure from cooperatives, new regulations from government and long-term support from the private sector — will make deforestation unnecessary and undesirable. This approach also complements Solidaridad’s wider goal of enabling the transition to a sustainable economy, in a way that is driven by the private sector but partners with parties throughout the supply chain. This will create mutually beneficial business practices, so that everyone is involved in bringing about change that matters.

Three areas of Central and South America where protecting forests is critical were chosen for the trial of the climate-smart coffee strategy: Chiapas in Mexico, Risaralda in Colombia and San Martin in Peru. Field operations were designed to test the business case and to find additional revenue for farmers. Deforestation is an attractive option because the newly cleared fields are more fertile than farmers’ existing land and they can rely on a bumper crop for the first three to six years. After this period, however, yields decline and new areas have to be cleared to maintain production. Opening up new areas is labour intensive and damages the environment, so making existing fields more productive and resilient is a more sustainable option for farmers. Higher yields and lower costs lead to higher profits and better livelihoods for farming families. Intercropping with fruit trees, banana and other crops diversifies food supplies and increases income, resulting in greater well-being and reduced poverty. Health care can be paid, children go to school, and food is available all year round.

### Climate-smart agriculture

Yields increased by 20% or more when farmers applied at least two climate-smart agriculture (CSA) practices in Mexico and Peru. These included adding compost to restore productivity, improve the soil texture and incorporate carbon content into the soil; establishing an agroforestry system of coffee trees with shade trees (Figure 1); changing wastewater treatment so less methane is produced and released; improving the management of coffee pulp; and establishing the correct density of coffee trees per hectare, according to fertility and slope.

**Figure 1. Agroforestry system, Peru**



Coffee agroforestry reduces greenhouse gas (GHG) emissions by employing a system of layered vegetation, with coffee the closest to the ground, then shade trees, and then an upper layer of high shade trees and timber species. Switching to a combination of chemical and organic fertilizer enabled farmers to increase soil organic matter, making it more fertile and richer in carbon. The Cool Farm Tool, an initiative of the Cool Farm Alliance, is used to measure the impact of these methods on GHG emissions. It analyzes farm data to gauge the impacts of coffee-smart practices on carbon stocks, which enables Solidaridad to measure emission reductions and carbon sequestration over the three years of the programme. The programme also led to discussions with governments and coffee roasters about protecting forests through boundary enforcement and reinforcing benefits within the supply chain.

Coffee roasters have three main concerns:

- They want to reduce operational risks by securing a future supply and avoiding high prices for green coffee beans in future.
- They want to increase customer confidence by actively taking care of people and the planet. According to a UN survey (UN Global Compact-Accenture 2014), consumers are becoming more environmentally aware, with 72% saying that businesses are not doing enough to safeguard the future of the planet and society as a whole.
- They also want to keep ahead of regulation on climate change that is driven by the European Union and the Paris climate change accord.



The EU wants to integrate environmental sustainability with economic growth and welfare, and is piloting ways to improve the overall environmental performance of products throughout their life cycles. As sustainability moves up the list of priorities for roasters, farmers that use CSA practices to acquire certification and reduce GHG emissions will be in a stronger position to compete for orders.

The main factors contributing to GHG emissions are the conversion of land from forest to agricultural use, fertilization, and the waste produced from coffee processing, such as wastewater and pulp. Where organic coffee is produced on existing fields, wastewater is the main source of GHG. On 81 sample plots in Mexico, for example, the Cool Farm Tool found that 80% of emissions were produced during the wet processing stage.

## Results

The programme showed that farmers can be part of the solution to deforestation, rather than contributing to the problem, if the pressures that lead them to abandon existing fields and expand are removed. From 2013 to 2016, 7,361 coffee farmers cultivating 16,000 ha were trained across the three target regions; together, they produced some 17,500 tonnes in 2015–16. Crucially, the total cost of the programme

per kilo of coffee was €0.07, or about the same as the premiums paid for certified coffee. So, it only would cost coffee roasters an extra €0.07 per kg to ensure that farmers earn a viable income without needing to clear forests.

In Colombia, the yield was highest, at 1,364 kg/ha, with a 5% increase in yield over the three years. The impact was more dramatic in Peru and Mexico, however, where initial yields were much lower, with a 74% increase in Peru (to 721 kg/ha), and a 31% rise in Mexico (to 476 kg/ha). Overall, 70% of farmers implemented at least two climate-smart agricultural practices, and it was encouraging to see that 16% of them were women. Solidaridad also trained 276 agronomists — well above the initial target — thanks to support from the Colombian Coffee Federation, virtual training courses in Peru, and that more agronomists enrolling for courses than anticipated.



More importantly, farmers realized clear livelihood benefits. The programme focused on early adopters, who represent 10% of the community, on the assumption that news of their better yields would encourage others. One producer in Peru who had previously cultivated 10 ha, said that the plantation was too large to manage with family labour alone. He reduced his plantation to 2 ha, but by applying good agricultural practices he harvested 21% more coffee than from his original field, which was five times the size — an improvement of

more than 600% per ha. This also left him with 8 ha of land to grow other food crops, or potentially to replant as forest if suitable incentives were put in place.

By giving farmers a viable alternative to clearing forest, the programme avoided 132 ha of deforestation in Peru and allowed 367 ha of farmland to be rehabilitated as forest in Colombia. But the effect on greenhouse gas emissions was more modest than expected, due largely to coffee rust: 75% of trees were infected in Mexico and a similar level in Peru. Practices had to be adjusted to include the replacement of infected trees, but new trees are not immediately productive; this significantly affected carbon performance. According to the Cool Farm Tool, CO<sub>2</sub> emissions were reduced by 27,869 tonnes, or 10.6 t/ha, with reductions of 79.3% in Peru and 74% in Mexico, but only 4.1% in Colombia (with the largest land area).

## Looking to the future

Zero deforestation is a new market trend that supports climate-friendly production and public policies. The first phase of this programme showed that public policies on deforestation and climate-smart agriculture are developing, but are still in their infancy. Once farmers are aware of the benefits from improved practices, they tend to adopt them. To reach more farmers, more support is needed from government and companies alike. Where pioneering farmers implement changes and their peers see the difference — as

happened in the three trial regions — it encourages others to follow. This leads to rapid yield gains, to the extent that farmers are able to produce more coffee from much smaller areas; this cuts costs and frees up land to diversify production or plant new forest. And since fluctuating coffee prices often lead producers to prioritize other activities, as a diverse portfolio makes farmers less vulnerable to market changes and gives them a more steady income, Solidaridad also helps farmers to diversify their production so they are not pushed into damaging activities such as clearing forests. Coffee roasters are also interested in climate-smart practices, but prefer to wait and see how carbon and coffee markets develop.

The second phase of the programme aims to accelerate the sales of coffee from zero deforestation suppliers and build new public-private partnerships that support and promote climate-smart practices. This will build on existing platforms such as SCAN Peru and the Sustainable Trade Platform in Colombia, and on strong relationships with ministries, producer organizations and private companies. Solidaridad will use these platforms to pilot new partnerships and mechanisms that help farmers make the transition. Private companies, working with government and farmers, will implement policies and practices to reduce emissions and deforestation linked to coffee production while improving farmers' livelihoods. This will also serve to maintain the carbon storage capacity of forests and will help Peru and Colombia meet their commitments to reducing greenhouse gas emissions.

## Case studies

### *Chiapas, Mexico*

The greatest challenge in Mexico is to increase productivity. Average coffee production in 2014–15 was 60 kg per ha, compared to 120 kg/ha in Peru and 168 kg/ha in Colombia. Using the Cool Farm Tool, Solidaridad established that 80% of greenhouse gas emissions generated during coffee production originated in wastewater produced at the wet processing stage. The old age of trees, along with infestation with coffee rust, also lowered productivity. Around El Triunfo National Park, Solidaridad worked with three cooperatives: Triunfo Verde SSS, Comon Yay Nop Tic SSS, and Federación Indígena Ecológica de Chiapas SSS, FIECH, with 192, 448 and 1,260 members, respectively. The programme introduced techniques to help mitigate climate change, including planting varieties resistant to coffee rust. Although farmers were slow to adopt these techniques, production is expected to triple to 180 kg/ha as these new practices are adopted. Producers with more than two plots can reduce their cultivated area, freeing up land to restore forest or diversify into other crops. Solidaridad is also leading the technical roundtable on sustainable coffee with Alianza REDD in Mexico, and implementing one of the few initiatives that is delivering concrete results in reducing deforestation and CO<sub>2</sub> emissions.



### *Risaralda, Colombia*

Involving 5,282 producers around Tatamá National Park, the programme developed close ties with the Colombia Coffee Federation (FNC) and the Neumann Foundation. To promote climate-smart practices that increase productivity and resilience, the programme trained 192 agronomists and established 900 demonstration farms. Two or more practices were adopted by 60% of farmers, and 720 ha were converted from non-shade systems to higher yielding, low-emission agroforestry; yields increased to 1,364 kg/ha in 2015–16, and 376 ha were reforested as conservation corridors. Local rural extension teams reached agreement to promote the planting of four main shade tree species in coffee agroforestry systems (although growers could also choose other species). The programme provided resources to young entrepreneurs to establish tree nurseries, giving them an income while guaranteeing the supply of seedlings. Working with the BANCO<sub>2</sub> payment system, farmers who own conservation forests and make a living from small-scale farming can become members of the payment system and make voluntary contributions to compensate for their CO<sub>2</sub> emissions. Solidaridad also organized meetings with political groups in 2015, an election year for mayors and governors, successfully pushing for candidates to put climate change on their agendas and making the case for the REDD+ mechanism.

### *San Martin, Peru*

In the area around the Alto Mayo Protected Forest, the programme began with 1,200 farmers in 14 cooperatives, and one exporter. All producers were visited three to four times a year by one of six agronomists, who advised them on improving farm management and implementing climate-smart practices. Since joining the programme, 81% of the farmers noticed qualitative and quantitative improvements in their coffee plantations, and 62% said that the new practices had improved productivity so much that they did not need to expand. Some were even considering scaling back to concentrate on smaller, more productive areas. Solidaridad became part of the regional Technical Coffee Platform, which encourages the sector to cooperate on common interests, and the regional government has adopted Solidaridad's approach to climate-smart coffee production.



### Conclusions

The adoption of climate-smart agricultural practices has reduced deforestation in high-altitude regions in Colombia, Mexico and Peru, and increased resilience to climate change by helping coffee farmers improve their yields. Solidaridad's programme found that farmers are motivated to improve production from existing fields by adopting climate-smart practices, and that this removes the need to clear new fields on higher ground, which in turn reduces deforestation and its associated carbon emissions. More efficient land use also enables farmers to increase their incomes and improve their food security by using spare fields for alternative crops. Importantly, regional governments also appear keen to scale up concrete approaches such as this.

### For more information

For training materials and online courses related to the Colombia case study, see [www.agrolearning.com](http://www.agrolearning.com) (in Spanish).

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