



# How Coffee Farming Communities Can Adapt to Climate Change: Experiences and Lessons from Costa Rica

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Absent adaptation measures, experts predict that climate change will reduce the global areas suitable for growing coffee by about 50% by 2050.<sup>1</sup> In coffee-growing countries like Brazil, Colombia, Costa Rica, Ethiopia, Guatemala, Indonesia, Uganda, and Vietnam, climate change can mean warming temperatures, irregular rainfall, and the spread of coffee pests and diseases, which can significantly disrupt coffee cultivation.

But for the world's 25 million smallholder coffee farmers, climate change is not the only challenge they face. In Costa Rica, the lives and livelihoods of these farmers are also hampered by coffee's low profit margins, the advanced age of many coffee trees, and high operating costs. How the country's nearly 40,000 coffee farmers adapt to the short-, medium-, and long-term challenges from climate change will have a profound impact on their future.

This brief summarizes the findings and recommendations from World Resources Institute's research on climate adaptation in one coffee farming region of Costa Rica: Coto Brus.

## In southern Costa Rica, Coto Brus coffee farmers are facing climate threats too

Among Costa Rica's eight coffee-growing regions, Coto Brus, with nearly 3,000 smallholder coffee farmers, is an area that is highly vulnerable to climate change. Given that coffee farming represents 70% of the Coto Brus economy, without implementation of adaptation measures, climate change could lead to devastating financial and social hardship in the years ahead. As climate change leads to warmer temperatures in Coto Brus and other threats, it will become more difficult to grow arabica coffee.

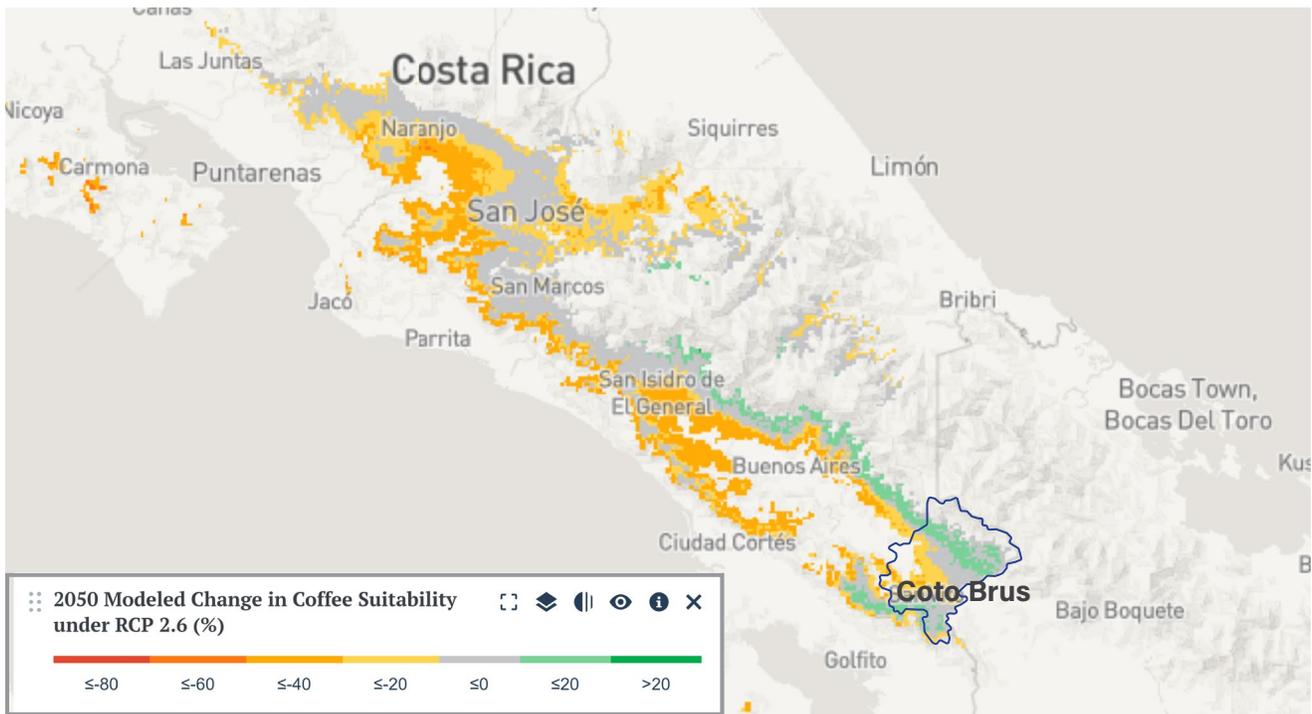
## About the project and the case study

The case study directly responds to a request for technical assistance from the Costa Rican Ministries of Agriculture and Livestock (Ministerio de Agricultura y Ganadería; MAG) and Environment and Energy (Ministerio de Ambiente y Energía; MINAE). Through the NDC Partnership, ministry officials requested World Resources Institute's (WRI's) technical assistance in February 2018 to build a common understanding of and greater clarity on actions that coffee producers, nongovernmental organizations, cooperatives, funders, and relevant ministries can take to improve the sector's climate resilience and long-term sustainability. WRI conducted desk research, a workshop, and interviews to create this case study of the challenges and opportunities that climate change presents to the coffee-growing region of Coto Brus. Below are a number of measures WRI identified that can enable greater climate resilience in Coto Brus and other coffee-farming areas.



Armando Navarro explains the climate adaptation measures he has implemented on his coffee farm, including terracing. *Credit: WRI.*

**Figure 1 | Like most of Costa Rica, large parts of Coto Brus are projected to experience a lower suitability for growing coffee by 2050 if no adaptation measures are taken**



Notes: The district of Coto Brus is outlined in blue. The green areas indicate increasing suitability for growing coffee, while the grey areas reflect no change. Yellow and orange areas reflect decreases in coffee suitability. RCP stands for Representative Concentration Pathway, a projection trajectory adopted by the United Nations of the atmospheric concentration of greenhouse gases given a certain level of effort to reduce emissions. This figure shows a low emissions scenario (RCP 2.6) with low climate impacts; that is, optimistic estimations of future emissions reductions. To explore and interact with these data and other climate scenarios, please visit the online platform PREPdata.org.

Source: Ovalle Rivera (2018) to learn about the suitability study, and IUCN and UNEP-WCMC (2017). Visualized on the PREPdata platform.

### Key factors that enable climate resilience in Coto Brus and potentially beyond



Well-led farmer associations and cooperatives can leverage their collective power to scale up adaptation efforts and explore new transformative pathways.

Farmers who have joined such groups are better able to organize their efforts to produce and commercialize coffee, and to share information on climate risks and best practices. They are also able to lower their financial risk, since each member can pool smaller amounts toward large investments.



Farmer-to-farmer learning and information sharing inspires other farmers to implement adaptation measures and sustainable practices.

Reaching coffee producers who are more tolerant of experimentation first can gradually pave the way for others to be positively influenced. Through peer-to-peer learning, farmers can share information on different adaptation options, including how and where support can be found, to help counteract limited government resources.



A dynamic ecosystem of institutions is in place to increase understanding of climate risks, support the implementation of resilience measures, and embark on transformative pathways.

In Costa Rica, institutions relevant to the coffee sector are well-coordinated and relatively well-informed of each other's activities; most have regional and local offices as well. Numerous institutions provide different types of technical, administrative, commercialization and financial assistance.



Coffee producers can form strategic cross-sectoral alliances to spur adaptation action.

Coffee farmers organized in small-to-medium-sized formal associations have allied with public, private, and academic institutions (including companies and NGOs) to acquire financing and resources to enhance their adaptive capacities. As climate impacts increase and intensify, the formation and strengthening of such novel alliances will become ever more important to scale up innovative adaptation actions and to ensure no producer is left behind.



Participation in national and international programs for sustainable practices can help farmers attain higher prices for their coffee and introduce or scale adaptation interventions.

The national Bandera Azul Ecológica Program, which has low entry requirements, asks that farmers engage in environmentally friendly practices such as agroforestry, improved soil and water management, and recycling of waste materials. Such practices, though not always implemented with climate resilience in mind, are ultimately no-regret actions that can enhance farmers' resilience to climate shocks.

## Six recommendations for a climate-resilient future

Working with stakeholders, WRI developed six recommendations for building a climate-resilient future for coffee farming communities. While these recommendations are specific to Coto Brus and other coffee regions in Costa Rica, they offer insights to institutions in other coffee growing communities globally.

- 1. Support the implementation, with regular technical follow-up, of promising adaptation options identified by local stakeholders to make coffee production more climate resilient.** These may include diversifying incomes through alternative crops or livelihoods, replanting farms with climate-resilient coffee varieties, and introducing new technologies and methods that can improve resilience by stabilizing or increasing farmers' incomes.
- 2. Establish baselines and monitor the impacts of adaptation measures.** Building an evidence base of farms' climate vulnerabilities and adaptive capacities and tracking the results of adaptation measures as they are implemented could allow farmers and the organizations that support them to understand how to allocate limited resources most effectively.
- 3. Map out when and where coffee may no longer be viable over the coming decades and explore equitable transformative pathways toward climate resilience, with stakeholder participation.** Transformative adaptation options include farmers switching to alternative crops like vanilla, cacao, and tropical fruits and exploring new livelihoods like ecotourism opportunities.
- 4. Develop farmer-tailored business administration and commercialization skills trainings as well as guidance to increase uptake of adaptation measures over different timeframes.** Developing these skills will increase farmers' abilities to assess different adaptation investments and options, manage expenses and timeframes, and access finance.
- 5. Create open communication channels to share information and raise awareness about climate risks and scale up adaptation efforts.** Bridging existing gaps in the flow of information across and between institutions and the private and nonprofit sectors will help ensure that all available resources, funding, and knowledge are being used to maximum effect.

6. **Expand and scale up peer-to-peer learning between farmers within and between regions.** There is an opportunity for institutions, associations, and cooperatives to facilitate more local, regional, and national participatory venues and events for farmers to showcase their adaptation efforts, including transformative adaptation measures, with their peers.

### Promising adaptation practices in Latin American coffee-farming communities

Costa Rica is one of a number of coffee-growing countries in Latin America beginning to plan and implement adaptation measures. The examples from Colombia, Guatemala, and Mexico highlight the positive role of public-private partnerships, new technologies or mechanisms, and the inclusion of associations and coffee farm families in building more climate resilient coffee farming communities.

#### Colombia

Since June 2018, a collaboration between the insurance company Blue Marble Microinsurance, Nespresso, and cooperatives has been testing a new type of insurance to protect thousands of coffee growers from extreme weather conditions. It uses satellite technology to identify farms affected by drought or extreme precipitation and then automatically distributes funds to affected coffee growers. Thanks to new government subsidies, the program is growing and costs for farmers are falling.<sup>2</sup>

#### Guatemala

Several international institutes are conducting research with members of the Barillense Association of Farmers (Asociación Barrillense de Agricultores; ASOBAGRI), a cooperative of more than 1,200 organic coffee-producing families, to improve coffee's resilience via local cultural practices. For example, a model is applied to predict which tree species are both most suitable under different climatic conditions and best able to diversify income.<sup>3</sup>

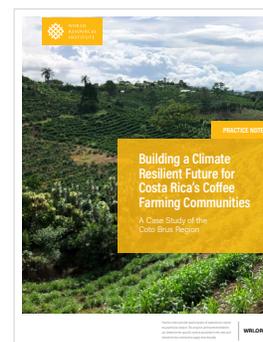
#### Mexico

The coffee sector of the Sierra Madre de Chiapas has a strategy for adaptation, mitigation, and reducing vulnerability to climate change developed through a broad alliance of institutions and producer families. The strategy seeks to articulate an effective commitment from society, governments, companies, and international organizations, proposing concrete measures in six priority areas. For example, the strategy proposes to include a vulnerability reduction methodology in all development projects to be implemented with coffee growers.<sup>4</sup>

### Acknowledgements, Further Reading, and References

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Additional resources on climate adaptation are available at: [wri.org/our-work/topics/governance](http://wri.org/our-work/topics/governance)



<sup>1</sup>Bunn, C., P. Läderach, O.O. Ovalle Rivera, and D. Kirschke. 2015. "A Bitter Cup: Climate Change Profile of Global Production of Arabica and Robusta Coffee." *Climatic Change* 129: 89. <https://doi.org/10.1007/s10584-014-1306-x>.

<sup>2</sup>Gatto, L. 2019. "Blue Marble Microinsurance Expands Weather Index Insurance Program for Smallholder Coffee Farmers in Colombia." *Business Wire*, September 4. <https://www.businesswire.com/news/home/20190904005560/en/Blue-Marble-Microinsurance-Expands-Weather-Index-Insurance>.

<sup>3</sup>Christel, D., A. Gerlicz, E. Mendez, and M. van Zonneveld. 2016. "This Is How Coffee Farmers in the Highlands of Guatemala Are Adapting to Climate Change." Blog. Climate Change, Agriculture and Food Security (CCAFS), May 12. <https://ccafs.cgiar.org/blog/how-coffee-farmers-highlands-guatemala-are-adapting-climate-change#XynH0ShKiUL>.

<sup>4</sup>Morales, M.G., E. de Melo, C. Jones León, J.A. Tinoco, T. Hills, A. Vázquez Vázquez, J.C. Castro, et al. 2011. *Estrategia Del Sector Cafetalero Para La Adaptación, Mitigación y Reducción de La Vulnerabilidad Ante El Cambio Climático En La Sierra Madre de Chiapas*.