CLIMATE SERVICES FOR THE COFFEE SECTOR

"The sustainability of coffee growing is threatened by climate change and price fluctuation" Ramón Vargas, coffee grower

Coffee is an important global crop and the second most valuable commodity exported by developing countries. More than 120 million people in 70 countries rely on its value chain for their livelihoods (The Climate Institute 2016). Coffee farming is an agricultural activity particularly affected by climate change. Rising temperatures and altered rainfall patterns are already affecting coffee yields, quality, pests and diseases, which in turn represent a threat to economic security in many coffee-producing regions. According to recent studies, 60% wild coffee species are under threat of extinction due to climate change.

MED-GOLD will identify opportunities for the development of climate services for the coffee sector over a range of timescales, that will complement the services offered by in-situ growing associations and cooperatives. Climate information underlying the services will be provided at higher spatial resolution, which is needed to account for geomorphology and improve forecasting at a local level, and with a reduced bias. These climate services tools will include customized products such as climate variables and numerical models that will help optimize both the long-term strategy and the shorter term agricultural crop management.

Time scale	Decision type	Challenges	MED-GOLD climate services tools	Benefits
Mid-term (e.g., 6 months)	Agro-management	• Optimize pest treatment • Anticipate best timing for harvesting	• Temperature • Precipitation • Solar radiation • Relative humidity • Physiological-demographic modelling for pests and productivity	• Reduce pest damage while protecting the environment • Maximize crop yield and quality
	Stock management	• Better estimation of coffee production • Improve the selling process		• Improve stock and selling planning
Long-term (e.g., 5-10 years)	Long-term strategy	• Select production areas • Assess incidence of coffee berry borer • Select appropriate species according to production areas (Robusta vs Arabica) • Select time of crop renovation • Define plant density	• Temperature • Precipitation • Solar radiation • Relative humidity • Physiological-demographic modelling for pests and productivity	• Future productivity per production area • Regional recommendations for improved crop management strategy • Cost-benefit analysis per production area • Exploitation adaptation and investment evaluation

Selection of appropriate coffee species

Colombia's coffee region is increasingly vulnerable to climate-change-induced disasters like flooding, drought and invasive pests. Traditionally, the country has been known as a top producer of *coffee arabica,* an emblematic Colombian crop that is cultivated at middle altitudes (1000-2000m) in the Colombian Andes. Unusual weather events related to climate change have direct and indirect impacts on *C. arabica*. A different species not widely cultivated in the country, *C. robusta,* seems to be a suitable alternative that, despite being affected by climate extremes, can tolerate higher temperatures and is more resistant to pests and diseases. Therefore, the coffee-growing areas could expanded into warming regions with *C. robusta* to counteract the *C. arabica* yield reductions. These new regions would be flat locations below 1200m, which in Colombia receive the name of *Orinoquía*, *Pacífico*, *Caribe* and 2 specific zones in Amazonia (*Caquetá* and *Putumayo*). *C. robusta* does, however, require higher rainfall, which, because of the increased likelihood of prolonged droughts, means that irrigation is likely to become an increasingly essential requirement.

The UNESCO-recognized coffee cultural landscape of Colombia, also recognized under the *'Café de Colombia'* EU-Protected Geographic Indication, requires specific management that could greatly benefit from the climate services provided by the MED-GOLD project. Besides, better climate forecasts and projections could become a useful tool for policy-making, helping growers associations and economic authorities to understand the impact of climate change on *C. arabica* and the potential expansion of *C. robusta* into warmer areas.

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Advantages of having access to long-term climate predictions:

1. **Selection of new production areas** with suitable climate to meet production and quality goals.
2. **Match adequate types of coffee species or even varieties to expected climate**.
3. **Identify years with adverse/favourable climate conditions** for coffee production (bad/good years).
4. **Identify areas where the coffee berry borer pest will limit production**

Glossary

Climate predictions: probabilistic forecasts of climate variables that extend further into the future than weather forecasts, from months and seasons up to decades

Climate services: transformation of climate-related data and other information into customized products such as trends, economic analysis, advice on best practices, and any other climate-related service liable to benefit that may be of use for the society

Phenology: study of the timing of biological events, such as flowering, leafing or reproduction, in plants

Physiological-demographic modelling (PBDM): best approach to study agroecological problems from the perspective of trophic level interactions that include the dynamics of coffee berry production, the coffee berry borer, natural enemies and agricultural practices

Seasonal predictions: probabilistic forecasts of climate variables for the next season (up to 6 months)

Weather forecasts: probabilistic forecasts of climate variables for the next hours and days (up to two weeks)

About MED-GOLD

MED-GOLD, Turning climate-related information into added value for traditional **MED**iterranean **G**rape, **OL**ive and **D**urum wheat food systems, is a 4-year project contributing to make European agriculture and food systems more resilient, sustainable and efficient in the face of climate change by using climate services to minimize climate-driven risks/costs and seize opportunities for added value

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