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The Implications of Climate Change on Mesoamerican Agriculture and Small-farmers Coffee Livelihoods

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Abstract

According to the fourth IPCC report Mesoamerica is one of the regions that will suffer severe impacts from a progressively changing climate. Coffee production is the mainstay of thousands of families and the major contributor to the agricultural GDP of these countries. Besides cash crops such as coffee, small farmers depend also on a variety of crops that are not well studied.

Under 2 different scenarios, and 12 downscaled GCM models we map the changing geographies of crop suitability to 2020 and 2050. First we quantify the impact of climate change on coffee suitability using data of thousands of geo-referenced coffee farms all over Mesoamerica and a maximum entropy approach. We then appraise the suitability of more than 30 major and minor crops that are important to small-farmers livelihoods (identified using the FAOSTAT database) and a modified version of the crop-niche suitability model Ecocrop. Combining the two analyses we quantify the impact of climate change on Mesoamerican agriculture in general and especially on coffee farmers livelihoods.

The analysis shows that a great deal of opportunities are likely to appear in Mesoamerican agriculture as a result of climate change if farmers have the access and information to change varieties and, if necessary, their crops. When crops are grown for cash, this is easy. However, when the crops are of large cultural importance and highly traditional, adaptation measures could be significantly more difficult. We use this approach to identify hotspots of both opportunities and significant challenges where fundamental shifts in the agricultural system may be required.

Keywords: Climate change, coffee, livelihoods