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The Problem

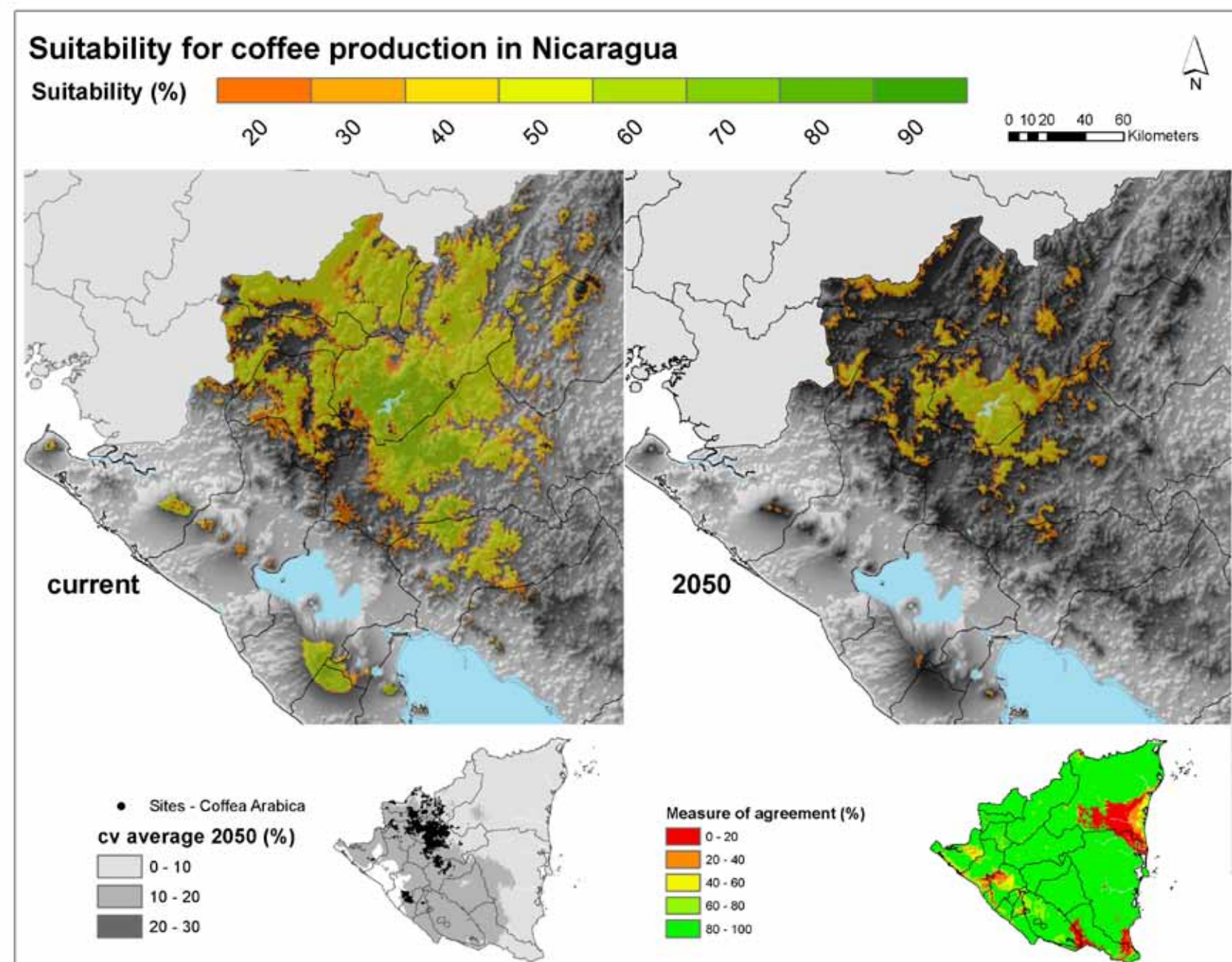
Mesoamerica is one of the regions suffering severe impacts from a progressively changing climate (4th IPCC report) while coffee production is the mainstay of half a million of families and the major contributor to the agricultural GDP of these countries. Change in crop suitability will have major impacts on farmers' livelihoods, since vulnerability of farmers is very specific to site and conditions.

Towards a Solution

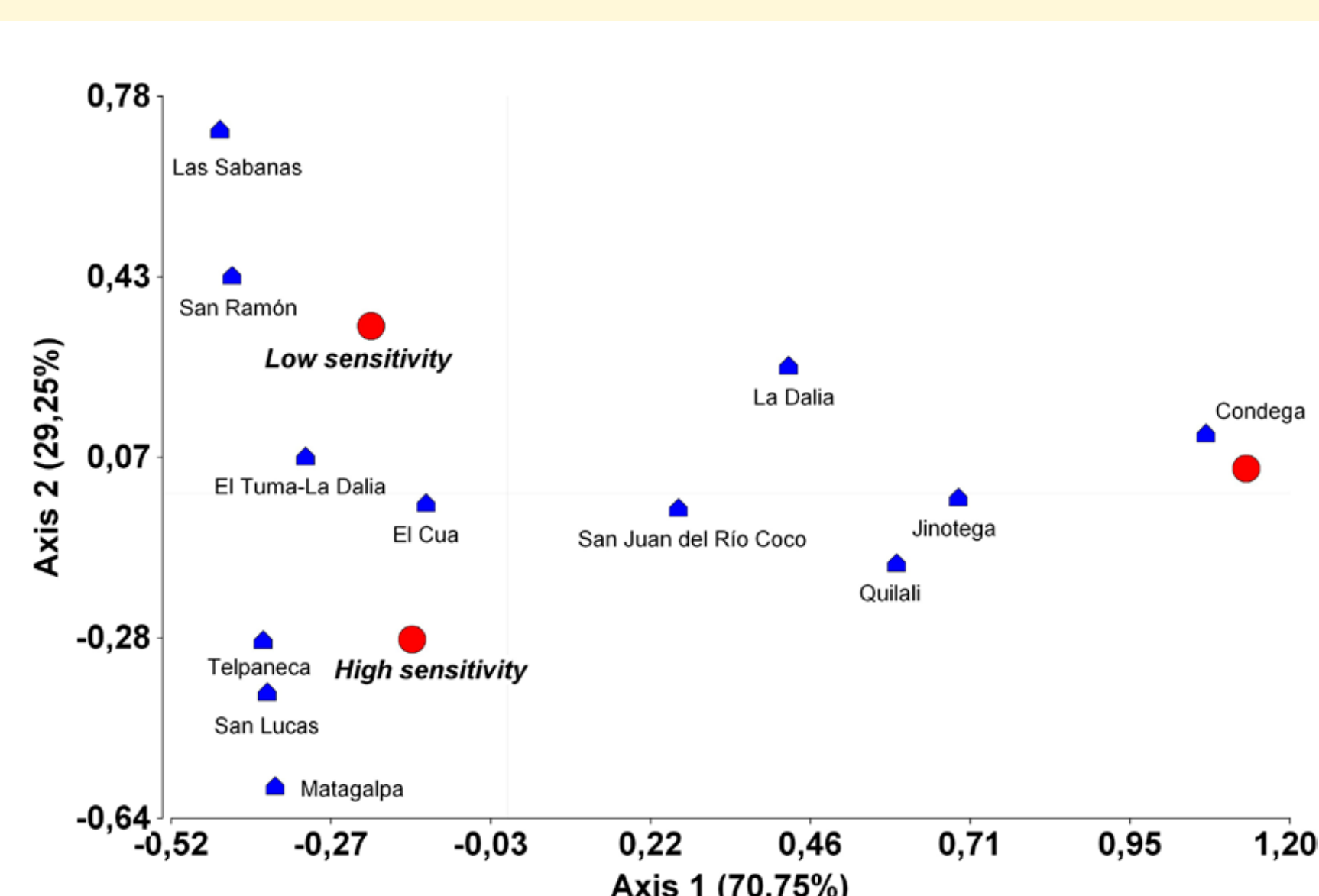
Specific adaptation strategies can be derived by analyzing and understanding farmers' vulnerabilities, sites and contexts. Farmers' vulnerability comprises exposure and sensibility to climate change, and capacity to adapt.

The Results

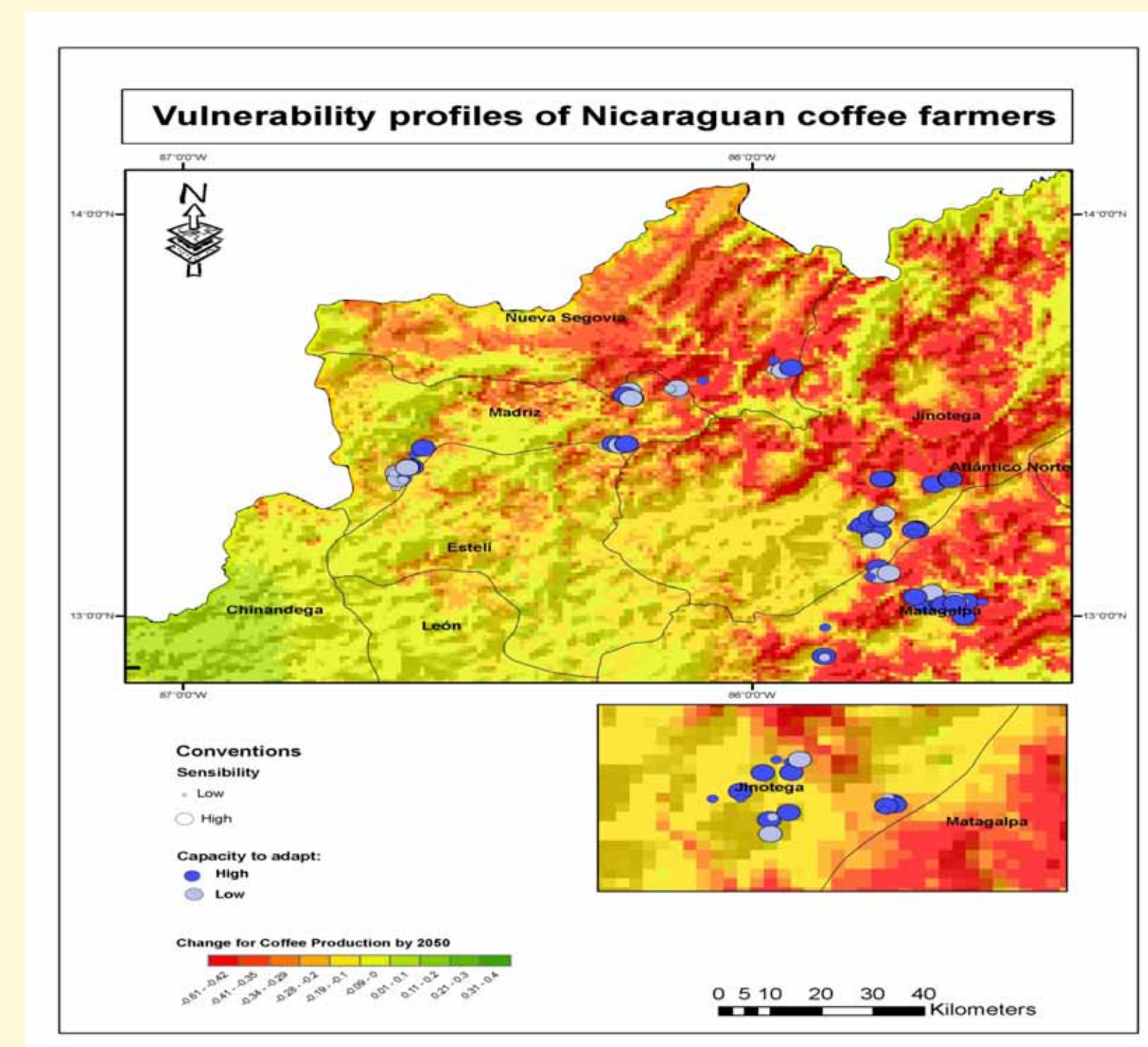
1. Exposure to climate change: Crop suitability predictions indicate an important decrease in the suitability of coffee-producing areas in Nicaragua by 2050. There is a pattern of decrease in the area suitable for coffee and a decrease in suitability within these areas. Suitability for coffee will move upwards on the altitudinal gradient with climate change, with lower-altitude areas losing suitability the most. The optimum coffee-producing zone will increase from 800-1400 masl to 1200-1600 masl by 2050 (Map).



2. Sensitivity and capacity to adapt: Coffee growing municipalities in Nicaragua have very distinct sensitivity and adaptive capacities (Graph). In general, families show high sensitivity in their physical assets in terms of the quality of post-harvest infrastructure, and in their economic assets in terms of the variability in coffee income and dependency on coffee. They show low adaptive capacity regarding their post-harvest facilities (they have to sell cherries without further processing if it rains). They show poorly developed market linkages among their financial assets and poor knowledge on pest and disease management during uncommon weather events.



3. Vulnerability profiles and adaptations strategies: Matagalpa is characterized by high sensitivity and low adaptive capacity (adaptation strategy focuses on diversification, capacity building and institutional strengthening). Madriz is characterized by low exposure, high sensitivity and low adaptive capacity (adaptation strategy focuses on conservation of natural resources, capacity building, diversification and raising awareness within governments).



The Conclusions

Analyses show that each single community has a very different vulnerability profile, which is reflected in the interactions with their available resources; therefore, community-specific adaptation strategies are needed. It is urgent to identify appropriate adaptation strategies for coffee, due to the long lead-time of perennial cropping systems and the complexity of global supply chains. These strategies must operate locally but be connected with the global supply chain. Work is carried out with the private sector, research institutions and 7,000 farmers in Central America on chain inclusive adaptation strategies.

Methodology

Exposure to climate change: GPS data of more than 5,000 farms in Nicaragua, climate data of more than 46,000 meteorological stations worldwide (Hijmans et al., 2005) and 18 downscaled Global Circulation Models (GCM) were used in a crop suitability model (Phillips et al., 2006).

Sensitivity and adaptive capacity: Through focal workshops with farmers and expert consultations, 20 indicators were identified, addressing five assets (social, financial, physical, human and natural) of the vulnerability analysis (IPPC, 2001). 150 farmers were interviewed; data analyzed and adaptations strategies developed jointly with farmers and supply chain actors.

Vulnerability profiles: The vulnerability assessment consisted of exposure, sensitivity and adaptive capacity analysis (IPPC, 2001).

Vulnerability

Degree of susceptibility and incapability of a system to confront adverse effects of climate change (IPCC 2001)

Exposure

Degree in which a system is exposed to significant variation in climate

Sensitivity

Degree in which a system is positively or negatively affected by climate related stimulus

Adaptive capacity

The ability of a system to adapt to climate change