

## RESEARCH REPORT:

### Climate Vulnerability of Smallholder Agriculture in Chiquimula Department, Guatemala

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The CLAS summer research grant supported my summer activities through allowing me to stay in Berkeley over the summer and focus on developing my research remotely. With the help of the grant, I was able to support myself in Berkeley and perform an extensive literature review and preliminary data analysis. In the process, I drafted a dissertation prospectus that will further my Central American-focused research and define areas of future work. I was also able to apply to future funding opportunities for in-field work in Latin America and connect with partners in-country who expressed interest in partnering with me and supporting me in my work. My living situation in Berkeley is with other graduate students who are also pursuing remote research, so the ability to stay with them created a network that provided accountability and support for my research project. Many of the suggestions for review, reflection and remote analysis came from them.

My project explores climate vulnerability of smallholder agriculture in Guatemala. For this summer, my plan was to travel to Guatemala to do preliminary research and begin connecting with other researchers and development partners in the region. I would also have done some scoping of potential development interventions in the community, but am now focusing more on shorter-term demographic and livelihood surveys that can be completed more rapidly when fieldwork resumes. During a time of uncertainty and change, the extra security that CLAS funds provided helped me adapt my project to a remote setting and explore future opportunities when travel is possible again.

Instead, I conducted an extensive literature review on climate migration and land cover, specifically looking at forest transition theory and livelihoods. This allowed me to better understand where my project would add value once on the ground and informed hypotheses for future research. Importantly, forest transition literature suggests that, as countries develop, changing economic and social factors including migration can cause forests to be valued over agriculture and reforestation can occur (Rudel et al. 2010; Redo et al. 2012; Aide et al. 2013; Leblond, 2019). Importantly forest transitions look at the interplay of macroeconomic processes and land cover across countries or regions, similar to my work. From a more local perspective, livelihoods also drive land cover changes including household members migrating and sending remittances, commodity booms, and changing cultural norms and values (Radel et al. 2010; Aguilar-Støen, 2012; Bonilla-Moheno et al. 2012; Ervin et al. 2020) Here, most of the literature explores case studies involving smallholder interviews and demographic information. This literature review supported the landscape and livelihoods analyses I hope to pursue in my

dissertation, as well as ongoing work in my lab on the social impacts and feedback loops of reforestation in the tropics.

In addition to this work, I developed and submitted a Fulbright Fellowship proposal to pursue this research in Guatemala next year. As part of the application, I connected with professor Edwin Castellanos of the University of the Valley of Guatemala, who agreed to host me in Guatemala when I begin field research. Prof. Castellanos was a lead author on the UN report on climate impacts to Central America (IPCC Chapter 2) and uses a similar methodology that explores climate impacts to smallholder farmers. His support will be incredibly valuable as I continue to pursue this research. I also submitted an application for a fellowship at [La Choza del Mundo](#) in Costa Rica, where I hope to explore drought impacts in a different region of the *Corredor Seco*.

### **Dissertation Prospectus (abridged)**

**Aim 1 (Chapter 1) Map the extent of agriculture across the *Corredor Seco* from 2000 to 2020, track drought stress through fallowed or water-stressed agriculture, and examine how drought years affect spatial patterns of land use.** Using Landsat imagery, map the extent of smallholder agriculture in the region using a trained cover classification. Compare year-to-year changes by overlaying trained images, and look for patterns of similarity between drought and non-drought years. Droughts are expected to decrease the extent of rainfed agriculture temporarily, although long-term farm abandonment is less likely because of land scarcity. Proximity to intact forest may decrease the chances of farm abandonment, as forest products may support farmers in-place (Bacon et al. 2017).

**Aim 2 (Chapter 2) Examine the impacts droughts may have on communities in the Guatemalan *Corredor Seco* and livelihoods by analyzing survey data and conducting interviews in affected communities.**

Using data generated in Aim 1, identify 2-3 communities highly impacted by droughts. Survey communities to better understand shifting livelihoods/practices at the household level. Also examine available census or survey data to understand how severe drought events may affect economic/demographic changes in the region.

**Aim 3 (Chapter 3) How are climate-driven droughts affecting the ways we talk about climate migration and adaptation in smallholder agriculture? Explore the systems and actors at play, the influence of politics and power, and outcomes (winners and losers).**

What are the institutions and practices that are springing up around climate adaptation, and what are the unexamined political aspects/implications of these institutions? How does international development change when it is branded as climate adaptation, or when its goal is to mitigate potential climate migration?

## Works Cited

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