



# Climate services for food security in Guatemala: An exploration of institutional dynamics in a colonial and neoliberal system

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## Abstract

Several governmental and nongovernmental institutions in Guatemala have been tasked with tackling the country's problem of food insecurity. Although food insecurity has a variety of causes, the issue of climate change is beginning to attract initiatives to address the problem. Thus, Guatemalan institutions have begun utilizing climate services (CSs) to provide climate projections (of six months) for decision-making in agriculture. These services are communicated through agroclimatic bulletins that provide advice to peasants and small farmers on agricultural practices, particularly relating to beans, corn, coffee, and vegetables. While most research in this area has focused on small farmers and peasants, the present study focuses on international and Guatemalan institutions as well as the CS advocates and the governmental officials who implement these services. Through semi-structured interviews, participant observation, and a review of institutional reports, we see that the CSs tend to be implemented in a way that CSs advocates neglect the colonial and neoliberal dynamics. Drawing on the concept of climate coloniality, this article shows that despite efforts of inclusion, vulgarization, and coproduction of knowledge, the technical discussion displaces other deeper discussions, such as unequal access to land and water and institutional racism, which have been underscored by several Guatemalan academics. The promise of modernity and discourse of progress dominate the Ministry of Agriculture, both in reports and speeches and conversations with public officials.

## Keywords

Climate services, food security, climate coloniality, institutions, Guatemala, neoliberalism

## 1. Introduction

In the last few years, initiatives aimed at deploying climate services (CSs) in Central America have gained traction. Since 2018, Guatemala has led the region with the creation and implementation of 19 local technical agroclimatic committees (LTACs). These LTACs can be described as temporary spaces of knowledge circulation where meteorologists, agronomists, crop advisors, and citizens congregate to discuss and coproduce agroclimatic bulletins (Giraldo-Mendez *et al.*, 2018). Vital for the growth and implementation of CSs are the CS advocates and institutions (e.g., INSIVUMEH, MAGA, and CIAT<sup>2</sup>) that consider that the livelihoods of peasants and small farmers can be improved with locally relevant climate information and agroclimatic advice. Thus, CS advocates have focused on improving communication with users by implementing a participatory approach that promotes inclusion, appropriation of CSs, and coproduction of knowledge (Knudson & Guido,

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<sup>2</sup> INSIVUMEH is the National Institute of Seismology, Volcanology, Meteorology, and Hydrology; MAGA is the Ministry of Agriculture, Livestock and Food; and CIAT is the International Center for Tropical Agriculture.

2019; Tart *et al.*, 2020; Vincent *et al.*, 2018). However, this article argues that in spite of these efforts, the implementation of CSs in Guatemala is embedded in colonial and capitalist ideologies of modernization and growth. Concerned with climate coloniality, the empirical data evince how tensions between climate and food policy regimes lead to the depoliticization and de-historicization of structural social issues. By examining the middlemen in charge of producing, translating, promoting, and communicating CSs, the article shows how CS advocates and other Guatemalan state officials are enablers and victims of capitalist and colonial dynamics.

Promoted by the World Meteorological Organization (WMO, 2010, 2011), CSs are a modern tool that provides seasonal (six months) and sub-seasonal climate forecasts aimed at providing tailored information for decision-making to improve livelihoods in health, water, disaster risk reduction, energy, and food security. In doing so, the WMO has advanced the National Framework for Climate Services to implement CS initiatives in countries in the Global South (Buontempo *et al.*, 2020; Hewitt *et al.*, 2013; WMO, 2014, 2016), primarily in Africa (Dinku *et al.*, 2014; Tall *et al.*, 2018), Southeast Asia (Ewbank & Aid, 2016), and Latin America. This framework involves the collaboration of several national meteorological institutions, boundary organizations, international organizations, academia, citizens, and other actors in developing mechanisms to enable the production of locally relevant climate information and improve food security among peasants and farmers (Giraldo-Mendez *et al.*, 2018; González, 2019; Lowe *et al.*, 2017; Naab *et al.*, 2019; Semazzi, 2011).

As part of a doctoral thesis examining the wider implications of implementing CSs for food security in Guatemala, this article discusses some of the existing linkages between the current methods used to implement CSs and climate coloniality. Drawing on empirical data collected in 2022, this work focuses on the role of middlemen; it examines how and why, despite practicing ideas of inclusion and coproduction of knowledge, those involved in CS implementation replicate and reinforce colonial and capitalist dynamics. The qualitative method adopted here included semi-structured interviews with CS advocates on the processes of CS implementation and their views regarding the effects of CSs on food security. Secondary sources, which included technical and academic participants (although not promoters) of the LTACs, were also important to provide a range of perspectives. In total, 11 semi-structured interviews were held alongside participatory observation and numerous informal conversations with crop advisors and technicians during fieldwork activities, which I was invited to participate in. I attended two LTACs, three Central American forums on CSs and food security, and Guatemala's national crop monitoring system meeting. The combination of these methods provided valuable and nuanced information regarding what was discussed and what was omitted within the CS discourse and its community, including information about the labor context in which they operate. Finally, discourse and image analysis were implemented on several reports produced by national institutions, such as INSIVUMEH, MAGA, and SESAN, as well as international institutions such as the FAO, the WMO, the WFP, the CGIAR<sup>3</sup>, *Acción Contra el Hambre*, and CIAT. I focused on ministerial policies, the agroclimatic bulletins developed between 2018 and 2023, and other institutional reports on food security and climate change in Guatemala. Although some reports were recommended by the institutional officials, they were all available on the website of each institution.

This article is divided into four sections. First, I provide an overview of the food production system in Guatemala to enable a better understanding of the context in which CS initiatives are being implemented. Second, I introduce the concept of climate coloniality and policy regimes to frame the theoretical approach used to explore the implementation of CSs for food security in Guatemala. Sections three and four draw on empirical data to identify and discuss how the implementation of CSs is embedded in colonial and capitalist ideologies of modernization and growth. Despite the aim to coproduce, empower, and include people who are vulnerable to climate change and food insecurity, CSs have become a tool of depoliticization and de-historicization. In this context, the modernization of the countryside has become an ideal that has overtaken the implementation process. Section five reflects on the importance of identifying the tensions between the food and climate policy regimes. While climate coloniality is usually understood as programs imposed on the

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<sup>3</sup> SESAN is the Secretary of Food Security and Nutrition; FAO is the Food and Agriculture Organization; WFP stands for the World Food Program; and CGIAR is the Consortium of International Agricultural Research Centers.

Global South by the Global North, this article also highlights the role that street-level bureaucrats with some level of power have in enabling the operation of climate coloniality.

## 2. A brief historical context of the Guatemalan rural landscape

CS advocates have been caught in the CS promise of livelihood improvement. CS initiatives have reached a country with a long history of food insecurity and the highest levels of child malnutrition in Latin America (Castro, 1952; Cleaves & Tuy, 2015; Prado-Córdova, 2011). Despite wider critiques of food insecurity as a multi-factorial issue (Castro, 1952; Davis, 2002; Drèze & Sen, 1991; Ferretti, 2021; Prado-Córdova, 2011; Prado-Córdova & Bailey, 2021), weather variability and climate change have become factors capable of generating collaboration and raising concern among the wider public (Beveridge *et al.*, 2019; FAO *et al.*, 2018; Sain *et al.*, 2017) because Guatemala is also one of the most vulnerable countries to climate change (Kreft *et al.*, 2014). As a result, CS advocates have gained relevance and support.

However, CS initiatives have taken for granted—or adapted to—a Guatemalan food system that excludes the majority of its population, most of whom are Maya communities. Since the Spanish colonization and even following independence, most of Guatemala's Maya population<sup>4</sup> has continuously been displaced and dispossessed from their territories. Between 2003 and 2016, infra-subsistence and subsistence farmers<sup>5</sup> represented between 84 and 61% of total rural households (Instituto Nacional de Estadística Guatemala, 2020; Ministerio de Agricultura, 2016, 2021). Furthermore, in terms of land tenure, commercial producers (i.e., three percent of all producers) owned 65% of the arable land, while 97% of small farmers occupied the remaining 35% of arable land. By 2016, Guatemala still held one of the highest coefficients of land inequality in Latin America: 0.84 in the GINI scale according to MAGA (2016).

Despite these issues, land reform was only advanced once in the 1950s by former president Jacobo Árbenz. As a result, the military, in conjunction with the United States, orchestrated a coup that resulted in a 40-year-long civil war, which ended with the Peace Accords in 1996. However, the Peace Accords also brought two new mechanisms of violence: impunity against crimes of war and a neoliberal market for the benefit of elites (Green, 2011). For instance, governmental policies in agriculture have prioritized conventional monoculture farms that rely on international food prices and the use of inputs for intensive production (Beveridge *et al.*, 2019; Van Etten & Fuentes, 2004), all to the detriment of small farmers and peasants. Neoliberal policies also brought austerity, the prioritization of international markets, and individual responsibility. As Hale (2002) maintained, neoliberal policies ushered in the "primacy of the individual, such as assessment based on individual merit, emphasis on individual responsibility and the exercise of individual choice" (Hale, 2002, p. 486).

Individualism and personal improvement through the incorporation of modern practices are not new. They were cultivated in the Civil War era between 1960 and 1996 and continue to manifest in ongoing development projects and mechanisms of assimilation aimed at pushing Maya communities away from their traditions to promote modernity and progress (Copeland, 2019b; Oglesby, 2013). This has also been the case in higher education in the capital city (Guzmán-Böckler, 1969). Consequently, MAGA's ministerial mission and reports continue to omit any recognition of Maya traditional knowledge and practices while emphasizing the desire to access international food markets and market competition through technology and the modernization of the countryside (Ministerio de Agricultura, 2021). In other words, CSs are not foreign to efforts of growth and modernization. In the following sections, I explore how the policy regimes of Guatemala's food system and climate infrastructure work together (or not) for food security. Some of the tensions raised in the following sections illustrate how climate coloniality can be produced and reproduced in the Global South by middlemen or street-level bureaucrats (Lipsky, 1980).

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<sup>4</sup> According to the 2021 census, 34.9% of the population identified as Maya; however, this figure has been contested by some academics, such as Cojtí (1991), who argued that it was well above 50%.

<sup>5</sup> According to MAGA, subsistence and infra subsistence farmers are owners of small plots of land who produce crops for self-consumption and are incapable of producing surplus for the market.

### 3. Climate coloniality in CSs

The institutions and CS advocates responsible of producing, translating, and delivering CSs are actors that enjoy some degree of power. They also form a complex web of relations that is worth exploring. To do so, I have engaged with Sultana's (2022) concept of climate coloniality to shed light on how government officials are both subjected to and enable the structural systems of oppression, namely patriarchy, capitalism, and colonialism. Due to space constraints, I will focus on the last two aspects. Thus, climate coloniality presents a framework with which to explore the role and side effects of CS programs in rural development. According to Sultana, climate coloniality is experienced through continued ecological degradations that are both overt and covert, episodic and creeping – e.g. pollution, toxic waste, mining, disasters, desertification, deforestation, land erosion, etc. – whereby global capitalism articulates with development and economic growth ideologies to reproduce various forms of colonial racial harms to entire countries in the Global South and communities of color in the Global North. (Sultana 2022, p. 4)

The implementation of CSs in rural Guatemala resonates with Sultana's concept of climate coloniality in various ways. To evince this, this article argues that climate scientists and the heterogeneity of actors involved in food production (e.g., peasants, small farmers, Maya communities, and agronomists) belong to different policy regimes. These policy regimes are a *mélange* that includes various groups of actors, objects, and literature that share distinct characteristics and topics of interest, one being food and the other climate. Each policy regime also has its own epistemic community, which is here understood as a group of scientists and professionals who "are responsible for developing and circulating causal ideas and associated normative beliefs and, thus, help to identify state interests and preferences as well as to identify legitimate participants in the policy process" (Haas, 2008, p. 3). Additionally, CS advocates, technicians, and state bureaucrats are all "'solution-starved' actors, often under pressure to 'deliver'" (McCann & Ward, 2012, p. 45) outcomes of pretested models. In this case, CS initiatives in Central America use methods employed in Colombia and countries in Africa.

A policy regime is a combination of the material—including human actors, crops, weather stations, computers, cars, cellphones, and road infrastructure—and immaterial—involving a set of principles, epistemologies, new knowledge production, socializations, governmental reports, markets, and institutions. One can say that observing the tensions in the CS production process is what Tsing (2005) detailed in her work using the term friction. The tensions produced between policy regimes respond to the incommensurable differences between epistemic communities and the different actors involved. In Figure 1, I show a simplified diagram of two policy regimes, including a non-exhaustive list of the actors involved in the CS production process in Guatemala, along with their concerns and some of the challenges they face. Each policy regime has beliefs and principles of their own and are both self-sustained, meaning that they can survive without the recognition of the other.

In this context, the LTAC and agroclimatic bulletins are the link between the policy regimes. It is a kind of "new green revolution for agriculture," which, paraphrasing Sultana, affects those historically affected by articulating "development and economic growth ideologies" with colonial harm (Sultana, 2022, p. 4). Green Revolution initiatives (Fischer, 2016; Fischer & Hajdu, 2015) and CSs alike are embedded in global capitalism, which is intertwined with the neoliberal state in Guatemala (Green, 2011; Hale, 2002) and the racial exclusion of the Maya population (Cojtí, 1991; Cumes, 2014; Guzmán Böckler & Herbert, 1970; Velásquez Nimatuj, 2016), which has been historically marginalized (Prado-Córdova, 2011; Schirmer, 2010; Ybarra, 2018).

By examining the process of implementing CSs, the following sections demonstrate the complex ways in which climate coloniality is manifested. Climate coloniality can sometimes be easily identified in governmental reports or conversations with state officials; however, it also manifests in power relations and through agroclimatic advice that is sometimes detrimental to the most vulnerable people.

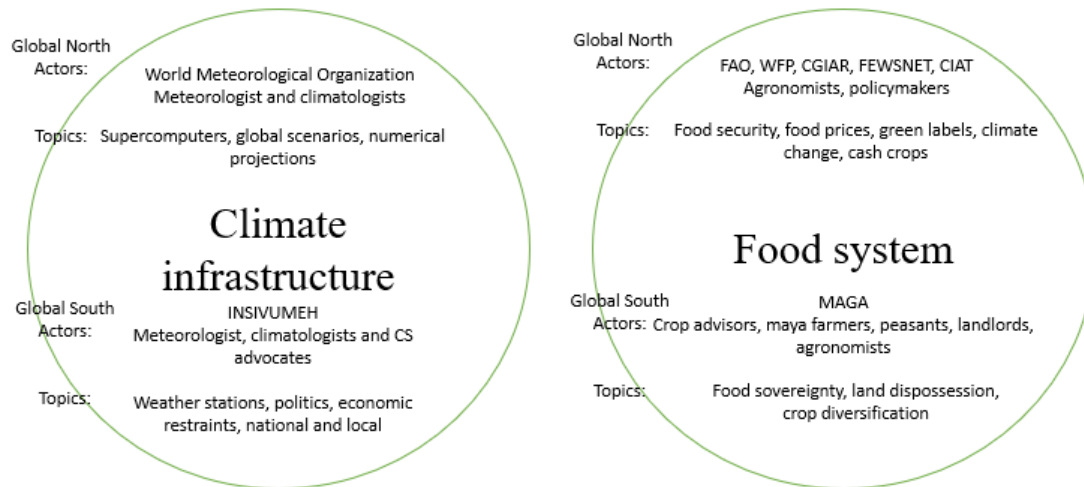


Figure 1. The policy regimes, their actors, and topics of discussion.

#### 4. Implementing CSs for food security

In Guatemala, agroclimatic bulletins offer advice on corn, beans, and other crops. These reports are distributed on several websites, in radio stations, by cellphone through WhatsApp groups, and word of mouth around the country. In the LTACs (as spaces of convergence), climate experts, CS advocates, and other food security actors try to incentivize top-down/bottom-up approaches to build trust with CS users. A key actor in the process is the CIAT, which provides a guidebook to train CS advocates on the best ways of teaching and transferring climate information. They also champion ideas of inclusion, the vulgarization of knowledge—or "climate alphabetization" as CS advocates call it—and knowledge coproduction (Giraldo-Mendez *et al.*, 2018). Vital for the expansion and reach of CSs is MAGA, a ministry that deals with Guatemala's food production and regulation. MAGA also has various forms of representation across the country, such as buildings for meetings and workshops or crop advisors to reach peasants in more distant regions. In other words, crop advisors are the "street-level bureaucrats" (Lipsky, 1980) meant to provide technical assistance to small farmers and peasants in grassroots environments. They materialize governmental policy by exerting a degree of power and autonomy within the local context. They are also expected to transfer CS information and provide agroclimatic advice based on their expertise and the climate knowledge acquired from the LTAC meetings.

In contrast to the ideals of CS advocates, the promise of inclusion and coproduction of knowledge is less clear in Guatemala's MAGA. In the latest Institutional Strategic Plan of 2021–2026, MAGA stated that its institutional mission was to incentivize modernity in rural Guatemala. Their mission was to foment integrated rural development through the transformation and modernization of the agricultural, forest and hydrobiological sector, developing productive, organizational and commercial capacities to achieve food security and food sovereignty and competitiveness, with clear norms and regulations for product management in national and international markets, all intended to guarantee natural resource sustainability (Ministerio de Agricultura, 2016, p. 59. My translation).

This is not surprising as Guatemala's history had been marked by a violent divide between the "cultural"—many interviewees referred to traditional indigenous knowledge—and what is understood to be the "modern." Preconceptions of the "cultural" were heard in almost all conversations with governmental officials during discussions regarding why Mayan peasants did not consume other varieties of corn or why they were reticent to change their agricultural practices. When I asked about the challenges of implementing the CSs, one

SESAN<sup>6</sup> official remarked as follows: "we have to fight against cultural barriers because the farmer will not change his habits just because the PhD doctor of climate is telling him to do so."

This example offers another reflection. The pursuit of progress and modernity through the idealization of technology and the market in Guatemala is powerful enough to overlook other structural social issues of inequality. For instance, one difference between the National Strategic Plan of 2016–2021 and the most recent one from 2021–2026 is the lack of acknowledgment of unequal land distribution in the latter (Ministerio de Agricultura, 2016, 2021). Under this umbrella, government officials expressed during the interviews that the social issue of land inequality "has nothing to do with the rich and poor gap because it's a structural situation that is not going to change," advising me not to go in that direction, as it is "a taboo topic" (Government official, Guatemala City, 2022).

In this context, the intentions of CS advocates to improve livelihoods in rural Guatemala contrast with their lack of acknowledgment of the effects of social inequalities and other systems of oppression on the population they aim to assist. In the LTAC environment, this occurs in four ways. First, food production has become a subject of the technical realm and is continually depoliticized and historically decontextualized. It leaves no space for social issues of land and water accumulation by extensive monoculture farms of sugarcane, palm oil, and banana. Second, the market-driven logic of production looks after the production of cash crops for the market and economies of scale. Third, the goal of teaching peasants about climate change and "modernizing" their practices has become a process that disallows alternative ways of knowledge from being heard or implemented. It has been reported that the ministry's challenge regarding Guatemala's indigenous communities comes from their "lack of understanding of how the market works" and their "individualistic behavior that is detrimental to communal collaboration" (Gobierno de Guatemala, 2022). The representation of the "other" as "ignorant and backward" is linked to the fourth aspect: the categorization and recategorization of peasants. Similar to Ybarra's (2018) claim that Maya communities have been categorized as "communists," "insurgents," and "narco-peasants," current MAGA reports reinforce prejudices by referring to them as "deforesters," "ignorant," and "traditional." As mentioned above, government officials use the word "cultural" as a mark of otherness that portrays Maya communities as stubborn and unwilling to incorporate new varieties of seeds, diversify crops, or implement agricultural practices to reduce soil erosion. These labels are maintained by an ignorance of traditional farming practices that have proven to yield beneficial agricultural results (Calderón *et al.*, 2018).

In LTAC meetings, the colonial structure of the Guatemalan government became palpable through their conversations. In this article, I shall comment on two experiences. Inclusion and "coproducing CSs" were evidenced when CS advocates introduced the 10-day advice frame called *decadía*, instead of a 15-day one, following the request of a crop advisor who voiced the demands of the peasants he worked with. A second example is the incorporation of the lunar cycle into the agroclimatic bulletins. However, after agreeing to introduce the lunar cycle, the CS advocate questioned the "real" effects it had on food production. He asked whether there was scientific evidence, to which one of the crop advisors replied that the moon had an undeniable effect on insect behavior, tree sap movement, and root development. The crop advisor then continued by adding that these effects occurred despite some people being clueless about it and (referring to the CS advocate's skepticism) that "some people live on the moon," which caused laughter among everyone in the room. Joking and teasing from the crop advisors in the LTAC were ways of manifesting discomfort and pointing out the flaws and limitations of the CSs and the differences between the policy regime actors.

In other meetings, the subject of discussion was the rise in fertilizer prices. The CS advocate recommended the self-production of organic fertilizer and soil management techniques. As I conversed with one of the crop advisors about what he thought of this advice, he told me that most peasants did not even own land and that if they did, they would not lose a few meters of land for soil management because they would have needed every meter for their corn. Additionally, small farmers would not invest in soil management on lands they did not own. These examples of "knowledge coproduction" and advice provision speak of the

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<sup>6</sup> SESAN is the Secretary for Food Security and Nutrition, which oversees international and national coordination of food security.

disconnect between government officials from the city and the reality of the landless in rural Guatemala. It also evinces that CS advocates and meteorologists from the climate policy regime are incapable of engaging with food scholarship and Guatemala's rural context before providing agricultural advice. More importantly, it shows how good intentions and desirable principles of inclusion and knowledge sharing in these programs of development are met with government officials who reproduce colonial and capitalist inequalities by ignoring current struggles and erasing historical accounts of dispossession and abuse.

Overall, the CS ideal of producing locally relevant information clashes with other local struggles faced by crop advisors, for instance, issues with water accumulation by sugar cane plantations, pesticide pollution by monocultures that affect bees, microclimates, and market fluctuation. Amid these tensions are the persistent question regarding why the CS advocates continue to advance local CS initiatives, an inquiry addressed in the next section.

## 5. CSs in neoliberal Guatemala

Once CSs are produced, CS advocates expect to reach users through radio, WhatsApp groups, but mostly through MAGA's crop advisors. However, the crop advisors who are meant to deliver and translate the agroclimatic reports to the peasants suffer economic constraints. Some government officials told me that while there were enough crop advisors to deliver the information, these officials were not well trained and did not know who their target population was. Untrained crop advisors are a weakness acknowledged even by MAGA, the ministry that hires them. According to reports by MAGA, 70% of their employees had short working contracts that spanned six months to one year (Ministerio de Agricultura, 2016, 2021). This turned the crop advisors and other bureaucrats into a malleable workforce reliant upon political interests. In this context, national and international experts agreed and recognized that they had to "work with what they had" and "keep the hopes that training the crop advisors on CSs and climate change would eventually reach the peasants, somehow" (CIAT official, Guatemala City, 2022).

MAGA also experienced austerity in terms of its infrastructure. Despite the continuous growth of national GDP, the ministry has kept the same budget throughout the past decade<sup>7</sup> (Ministerio de Agricultura, 2016, 2021). As we visited MAGA offices in the capital's neighboring city of Escuintla, I received welcoming words from the janitor, who thanked us for not forgetting about them. Other crop advisors used the meeting to vocalize their complaints, saying that they wished that they had more support from Central MAGA<sup>8</sup>, specifically working equipment such as computers. The lack of ventilation and fans in the meeting room in Escuintla, a city with very high temperatures, was also a sign of negligence and precarity. During our meeting, as the morning progressed, the temperature increased in the room, and the heat took a toll on some participants, who became sleepy and tired. Such daily conditions make it more challenging to reach crop advisors and peasants.

INSIVUMEH also experienced the same economic constraints. For the meteorological institution, this meant that they had to work with a limited number of weather stations, which did not always meet WMO standards (González, 2019). Lack of personnel was also a challenge, and they relied on citizens or other NGOs to operate the weather stations and report the data on a daily basis. Public-private partnerships were also important for INSIVUMEH because of their reliance on privately owned weather stations. This collaboration could be contentious, as the crop advisor remarked, since the private consultancy institute that shared the meteorological data worked closely with the sugarcane farmers whose work directly affected the peasants and small farmers they claimed to assist.

The lack of materials was not the only concern. For CSs, the idea of decision-making is primordial; however, decision-making also involves the transfer of responsibilities from the state to the individual. Thus, the meteorologist was aware of his share of the responsibility when deciding which climate model was best suited to Guatemala. After making his decision on the climate model to follow, this information was passed on

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<sup>7</sup> From 2004 to 2015, Guatemala's national budget increased from Q30,000 to Q70,000 million (US\$3.8bn–7.98bn, and around 10bn in 2022). In contrast, MAGA's budget continues at around 1.74% of the national budget. Source (MAGA's Institutional Strategic Plan 2016–2021, p. 27; 2021–2026, p. 145).

<sup>8</sup> Crop advisors here are MAGA delegates in rural Guatemala as opposed to Central MAGA officials that run the LTACs.

to the agronomists and agricultural technicians so that they could produce agroclimatic advice for the region. The chain of responsibilities continued downward until the peasants and farmers were reached at the bottom. Although there was a general sense of shared responsibility among all participants, two considerations remained notable. On one hand, except for the small farmers and peasants, there were no other participants whose livelihoods depended on agriculture. On the other hand, when the peasants and small farmers decided not to make use of the CSs, state officials felt entitled to label them as "stubborn." In other words, the logic of translating responsibilities became problematic as it reinforced the idea that peasants could overcome structural issues, infrastructural deficiencies, and social inequalities only with a bit of "modern" knowledge. Furthermore, the CS initiatives did not contemplate a response to potential mistakes around their CS advice. This left the crop advisors in an uncomfortable position. Similar to Haines's (2019) experience in Belize, Guatemalan crop advisors were reticent to provide advice based on CSs because they did not want to give erroneous information and could affect entire families who were already vulnerable.

In this context of material dearth and individual responsibility, the production of organic fertilizer became convenient for the CS advocates. Although alternative agriculture was not considered in the MAGA documents, self-made organic fertilizer spoke of a government that had decided to take a step back from its citizens to transfer to them the responsibility of adapting to climate change (Copeland, 2019a). The human and economic limitations experienced by the governmental institutions turned MAGA into a kind of workshop ministry that was only capable of transferring information through workshops and conferences to talk about improving genetics—in cattle and plants—modern techniques of irrigation, fertilizer application, and lastly, climate knowledge through CSs.

## 6. Reflecting on CS

As we have seen throughout this article, tensions between the climate infrastructure and food policy regimes in Guatemala manifest in several ways. As a result, CSs have become a tool of de-historicizing and depoliticizing food insecurity. Whether due to unwillingness or lack of time, CS advocates have decided to focus on inclusion, teaching, and the coproduction of CSs to address profound social injustice. However, the street-level bureaucrats involved in the process are indirectly forced to participate; otherwise, they would also become "stubborn" Guatemalans and potentially lose their jobs. Analyzing the tensions between the policy regimes has allowed this research to demonstrate how climate coloniality operates in Guatemala and manifests at the local level in unlikely ways.

Taking into consideration that CS advocates work under the Green Revolution banner, which favors conventional agricultural methods to increase yields, the advice given to produce organic fertilizer evinces a couple of tensions. On one hand, it manifests a degree of ignorance regarding the urgency of supplying the crops with fertilizer, as there is no consideration of the time and space it takes to produce organic fertilizer. Specifically, it does not acknowledge the *lack of land and resources* required to produce organic fertilizer of sufficient quality and quantity. On the other hand, instead of improving the livelihoods of small farmers and peasants, the main purpose of CS advocates has become the provision of advice. In other words, "solution-starved" bureaucrats are conditioned to deliver results and secure their unstable and short working contracts.

Overall, framing the implementation of CSs as a program embedded in climate coloniality raises concerns and new questions. As seen throughout this article, reproducing climate coloniality requires the collaboration of middlemen and state bureaucrats. Thus, it is worth asking, who should the decision-makers and CS users be? How does focusing on small farmers, peasants, and crop advisors absolve high-level officials from responsibility and accountability? Should high-level government officials and ministers who have been provided with agroclimatic information be held accountable if they lack a response? If ministers do not use CSs for decision-making, should they also be considered "stubborn" and "traditional?" Addressing these questions could enable new paths and considerations for the future of CSs in Guatemala and other countries.

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