

Adaptation and Mitigation Strategies and Indigenous Land Use in Papua New Guinea

P A 397 G Analytical Methods for Global Policy Studies

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Theorization

Introduction

As climate change progresses, adaptation to climate change becomes an increasingly pressing and vulnerable issue. Adaptation is defined by the United Nations Intergovernmental Panel on Climate Change as “adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects and impacts, to moderate potential damages or take advantage of opportunities associated with climate change.”¹ Instead, adaptation “needs to be integrated properly into national development plans” to be effective.² Our research looks to answer how the government and the private sector can promote economic growth while being mindful of its effects on the environment and benefitting Indigenous communities through collecting information from individuals in Papua New Guinea. We ask, “What are the attitudes Indigenous communities hold regarding changing sources of livelihood and land use?” to gain insight into the feelings of Indigenous communities to inform courses of action by the government so that it can craft and implement effective policies.

Literature Review

The complicated nature of climate change and the multilevel impacts of environmental changes require research that addresses inputs and solutions from a multitude of perspectives. Much work remains to be done in accessing and understanding climate adaptation in developing countries. Environmental and economic priorities are often in competition as developing

¹ I. Burton, B. Challenger, S. Huq, R.J.T. Klein, and G. Yohe, “Climate Change 2001: Impacts, Adaptation, and Vulnerability,” The Intergovernmental Panel on Climate Change, 879, 2021, <https://archive.ipcc.ch/ipccreports/tar/wg2/index.php?idp=642>.

² Norio Saito, “Mainstreaming Climate Change Adaptation in Least Developed Countries in South and Southeast Asia,” *Mitigation and Adaptation Strategies for Global Change* 18, no.6 (2013): 825–49, 826, <https://doi.org/10.1007/s11027-012-9392-4>.

countries are compelled to push climate commitments to the future due to immediate issues of poverty.³ Some scholars, such as Bhattacharya et al. see climate change as an issue of deep injustice and inequality. “Developing countries that have contributed the least to climate change are also the most vulnerable to climate change,” so any environmental research must be conducted in conjunction with developing economic policies.⁴

Al-Zu’bi examines how the nation of Jordan struggled to integrate climate change into national policies.⁵ Through interviews with government officials, the author breaks down how the lack of policy implementation was caused by “the lack of a high level of endorsement by the cabinet, a high level of turnover in the ministries, and prevalence of competition over cooperation in the approach of some stakeholders at the national level”.⁶ Findings from Al-Zu’bi echo the idea that a critical understanding of climate change as a national priority is required for effective governance and management. Strong intersectoral coordination through advocacy and programming is necessary to address climate change impacts strategically. However, governments lack the initiative to implement policies to combat climate change. An important aspect of the author’s findings is that for mitigation strategies, stakeholders such as businesses and citizens were not included in the dialogue of policy development and, therefore, were unable to be efficient as those connections to government were not being made.⁷

Mertz et al., in trying to understand how this tension impacts adaptation to climate change, outline two theoretical approaches. One of these is a more pragmatic approach looking at

³ Bhattacharya et al., “Why Developing Country Voices,” 2.

⁴ Bhattacharya et al., “Why Developing Country Voices,” 4.

⁵ Maha Al-Zu’bi, “Jordan’s Climate Change Governance Framework: From Silos to an Intersectoral Approach,” *Environment Systems and Decisions* 36, no. 3 (2016): 277–301, 285, <https://doi.org/10.1007/s10669-016-9602-9>.

⁶ Al-Zu’bi, “Jordan’s Climate Change,” 285.

⁷ Al-Zu’bi, “Jordan’s Climate Change,” 287.

how to make climate a more mainstream issue and integrate it with concerns of economic development and poverty reduction.⁸ A pragmatic approach looking at specific economic policy must be grounded in the relevant country's needs, priorities, capacity, and economy. This increased interest in incentivizing demand-side stimulus for green energy is integral to understanding climate adaptation. As the disparate impact of extreme climate events becomes more pronounced, country-specific context and facts will become especially important in developing roadmaps for climate adaptation.

The island of New Guinea, which houses the country of Papua New Guinea and the Indonesian province of Papua, is home to one of the planet's largest, most extensive, and most diverse tropical rainforests. However, the region is under increasing threat from land-use changes and consequential deforestation as Papua New Guinea becomes "a new frontier for economic development" as oil palm plantations and logging take over the land.⁹ The Manokwari Declaration, signed in 2018 by both Papua New Guinea and the Indonesian province Papua, aims to "protect more than 70% of Tanah Papua's land area and ensure sustainable development for the benefit of Indigenous communities".¹⁰ This gives Indigenous communities access to land and promotes bottom-up initiatives by focusing on community-based natural resource management such as through the social forestry program.

⁸ Ole Mertz, Kirsten Halsnæs, Jørgen E. Olesen, and Kjeld Rasmussen, "Adaptation to Climate Change in Developing Countries," *Environmental Management* 43, no. 5 (2009): 743–52, 744, <https://doi.org/10.1007/s00267-008-9259-3>.

⁹ Christoph Parsch, Benjamin Wagner, Margaretha Pangau-Adam, Craig Nitschke, Holger Kreft, and Julian Schrader, "Papua at the Crossroads: A Plea for Systematic Conservation Planning in One of the Largest Remaining Areas of Tropical Rainforest," *Frontiers in Forests and Global Change* 5 (2022), 2, <https://www.frontiersin.org/articles/10.3389/ffgc.2022.763131>.

¹⁰ "Manokwari Declaration," 2018, 4, 1, <https://www.idhsustainabletrade.com/uploaded/2018/12/MANOKWARI-DECLARATION-2018.pdf>.

Further research is needed to better understand how traditional practice and local knowledge play into the land-use management of Indigenous people. By recognizing patterns and areas of further improvement, conservation efforts can be better adapted to include the Indigenous peoples' practices while maintaining local livelihoods. The Manokwari Declaration tries to return agency to the Indigenous communities but faces problems with enforcement and ambiguity from the government. Our research hopes to supplement the gap by focusing on a specific fraction of the Indigenous communities impacted by land-use management and environmental changes: climate refugees.

For small Pacific island communities, migration will become increasingly necessary as environmental change intensifies the restrained resources. Connell and Lutkehaus (2017) look at the impacts and resettlement projects in Papua New Guinea of two communities, one abrupt migration in Manam resulting from a volcano eruption and one in the Carteret Islands from a gradual onset of climate change impacts and the loss of island livelihoods. Despite the socioeconomic differences and reasons for migration, both case studies demonstrate migration as adaptation and the challenges of environmental change on development while explaining the key to resettlement problems as the role of land.¹¹ After the volcanic eruption, the Manam people were displaced and resettled in already-populated coastal lands. The coastal landowners, a century ago, gave up their land to colonial plantations in exchange for employment and services. This was a favorable exchange as giving up land meant economic benefits in other forms. On the other hand, the new settlements do not provide the same economic benefits to the coastal communities nor were they compensated for being the hosts. The tension erupted in violent

¹¹ John Connell and Nancy Lutkehaus, "Environmental Refugees? A Tale of Two Resettlement Projects in Coastal Papua New Guinea," *Australian Geographer* 48, no. 1 (2017): 79–95, <https://doi.org/10.1080/00049182.2016.1267603>.

conflicts, and a decade after the explosion in 2015, many Manam islanders chose to return to Manam despite the lack of infrastructure. Mistrust in the government's ability to help them and traditional values placed in the ancestral land are the main reasons for the islanders' return despite the ever-present threat of volcanic destruction in Manam.¹² For islanders who chose to stay in the resettlement sites, land disputes continue with the locals and face competition for prime real estate from development companies. The Carteret Islanders' migration, in comparison, is much more gradual. After facing decades of food shortages and unstable income from underdeveloped commercial agriculture and fishing industries, the people of Carteret were given limited land in nearby Bougainville to resettle. However, without financial resources and a clear plan from the government or other organizations, the Carteret Islanders find themselves struggling to resettle on this new land while suffering cultural loss tied to their homeland. For both groups, the replacement of ancestral land, by association methods of livelihood, with the new land is a difficult adjustment due to the loss of identity, struggle over adequate land, and gaps in knowledge of the local environment.¹³ This study exemplifies the problematic and controversial space of land management. While effective land management is at the core of sustainable development and economic opportunities, the social relationships that stem from land and belonging are at the core of better understanding the challenges faced by climate refugees. The conflict and uncertainty that stem from land use and ownership are not new nor specific to these communities. Cultural attitudes toward migration show uncertainty about retaining community in the new settlement where newcomers are not welcomed and fear the loss of their identities. Understanding the social notions of land usage is instrumental to creating more

¹² Connell and Lutkehaus, "Environmental Refugees?," 79-95.

¹³ Connell and Lutkehaus, "Environmental Refugees?," 79-95.

durable and equitable solutions to climate change. The detailed case studies mention the potential roles governments and the private sector with financial abilities can play to aid climate refugees but do not go into depth about specific actions.

Our research aims to look more closely at how a multisectoral response to climate change affects climate refugees in small, coastal communities in Papua New Guinea who also face challenges of economic development. Mertz et al conclude that it is most effective to introduce more climate-resilient development strategies in combination with general development efforts in the poorest communities to increase their adaptive capacities.¹⁴ Al-Zu'bi's example in Jordan asserted the need for an effective multisectoral approach to climate change initiatives.¹⁵ Research specific in Papua New Guinea emphasized the need to involve Indigenous voices and agencies in determining land use from a bottom-up community, grassroots perspective.¹⁶ We want to understand how Indigenous and local communities, in particular those facing the highest risks of climate displacement, are participating in this transition to land use and adaptation to climate change effects.

Our research question is: What are the attitudes Indigenous communities hold regarding changing sources of livelihood and land use? Intersectoral agencies can support these communities through implementing sustainable and accountable economic developments. The scholarship on Papua New Guinea reviewed shared ambiguity and lack of transparency on what the government and private sector are doing to regulate and financially support these transitions.¹⁷ To respond to this gap of knowledge, we want to further our research to understand

¹⁴ Mertz et al., "Adaptation to Climate Change," 750.

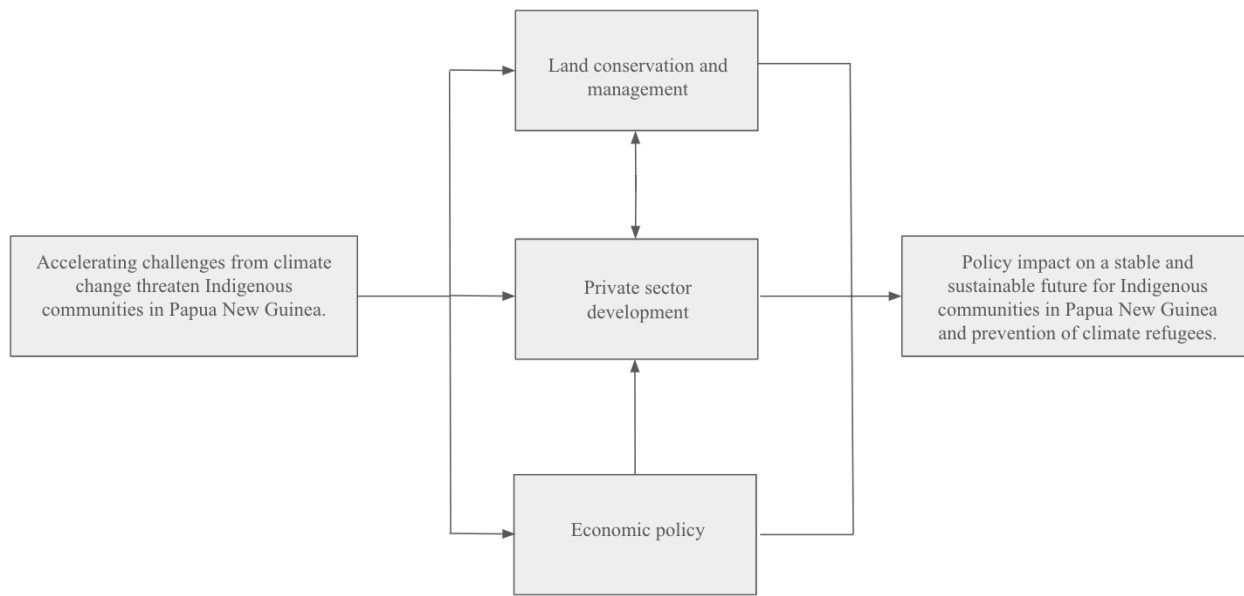
¹⁵ Al-Zu'bi, "Jordan's Climate Change," 284.

¹⁶ Parsch et al., "Papua at the Crossroads," 4.

¹⁷ Parsch et al., "Papua at the Crossroads," 2.

ways the government and private sector can most effectively promote economic growth in accordance with environmental regulation through policymaking and investments while benefiting Indigenous communities. As climate change continues to accelerate the need for climate adaptation, the issue becomes a worldwide humanitarian issue where it becomes increasingly important to consider voices historically left out of the discourse.

Theoretical Framework



We start our research from the current, delicate position Indigenous communities are facing in Papua New Guinea. Climate change, rising temperatures, and encroaching sea levels threaten the livelihoods and homes of island communities. Given this setting, we establish three explanatory variables: economic policy (by the Papuan government), private sector development, and land conservation (policy and/or implementation). We believe these three variables interact with the climate challenges faced by indigenous communities and are able to change the outlook for these communities and increase/minimize the risk of becoming climate refugees.

Economic policy will dictate the outcomes in the face of climate change. Depending on the opportunities and incentives that the Papuan government creates for private businesses and

indigenous communities, it will either further jeopardize the indigenous peoples' livelihoods or increase economic stability in these coastal regions. Economic policy will interact with land management/conservation policy and will either reinforce sustainability or subvert it.

Private sector development can be a result of economic policy and is also either constrained or will challenge land use norms. While the private sector could increase economic opportunity for indigenous workers, it is also possible that more development in these vulnerable regions will further damage the environment and natural resources and crowd out the indigenous workers that inhabit this land.

Conservation and land use policy, and the strength of property rights, in these communities add a layer of complexity to economic and private sector activity. The effects of such policies may be negligible if they jeopardize climate adaptability or degrade the environment further. The long-run prospects for the indigenous communities in Papua New Guinea depend on the suitability of their coastal homelands, and whether or not they are forced to migrate to escape climate disasters.

Research Design

The Southeast Asian context is especially important for this task of developing country-specific knowledge, as the capacity for adaptation is generally higher in Asia-Pacific than in Africa, but the magnitude and consequences of adaptation needs might be larger.¹⁸ Building on the background knowledge, our research focuses on maritime Southeast Asia, which houses one of the three largest carbon sinks on the planet. Potential flooding of the many highly populated river deltas will either be extremely costly to prevent or lead to mass movement of people to

¹⁸ Rex Cruz, H. Harasawa, Murari Lal, S. Wu, Y. Anokhin, B. Punsalmaa, Y. Honda, Mostafa Jafari, C. Li, and N. Huu Ninh, "Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," (2007), 469–506.

other areas¹⁹, and some Pacific islands might have to be abandoned altogether either because of flooding or loss of ecosystems needed for subsistence.²⁰ Moreover, the predicted decline in agricultural production without adaptation in Asia will affect an even larger number of poor urban and rural populations than in Africa.²¹

Our research approach will be a combination of using the case of Papua New Guinea and using random sampling of the indigenous populations who live in the village regardless of ethnic group to collect information from individuals. We hope to use a stratified sampling method to get interview answers to provide a wide expanse of information for a more complete answer. We hope that by highlighting indigenous populations, we can see what changes, mitigation, or adaptation strategies indigenous individuals would favor.

Data Collection & Instrument Design

Q1	Are you concerned about forest loss?
Q2a	If yes-- what aspects of forest loss concern you?
Q2b	If no-- What leads you to not see it as a concern?
Q3	Do you personally make use of a forest or goods from it?
Q4	Who do you believe should have access to use forested land?

¹⁹ Cruz et al., "Climate Change 2007," 485.

²⁰ Nobuo Mimura, Leonard Nurse, Roger McLean, John Agard, Lino Briguglio, Penehuro Lefale, Rolph Payet, and Graham Sem, "Climate Change 2007: Impacts, Adaptation, and Vulnerability. Chapter 16: Small Islands," Intergovernmental Panel on Climate Change, 696, 2007, <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg2-chapter16-2.pdf>.

²¹ Bhattacharya et al., "Why Developing Country Voices," 4.

Q5	Have you heard of the Merauke Integrated Food and Energy Estate?
Q6a	If yes-- What are your thoughts about it?
Q6b	If no-- How do you feel generally about large land-use projects in the Merauke forest?
Q7	How familiar are you with the Manokwari Declaration, signed in October 2018?
Q8a	If familiar with the Manokwari Declaration, do you feel that it reflects your desires and values?
Q8b	If unfamiliar with the Manokwari Declaration, how do you feel generally about government action regarding the use of forest land?
Q9	How has government action (the Merauke Integrated Estate, Manokwari Declaration, or another action) impacted your use of the land?
Q10	Has your use of the land changed recently? If so, how?
Q11	Do you feel any pressure to migrate or leave your home?
Q12	How do you view resettlement/migration due to natural disasters or climate change?

Coding

For analyzing our semi-structured interviews with members of the Indigenous Papua New Guinean communities, we will employ a thematic analysis. Thematic analysis, which looks

at raw transcriptions from interviews through the lens of patterns or themes,²² is appropriate for our research goal of examining multisectoral climate change responses in Papua New Guinea and its effect on climate refugees because this type of analysis can provide a broad, “wide-angle” view²³ of the policy problem, and heavily relies on the lived experiences of participants. Giving voice to the Indigenous communities and climate refugees is one of our main goals with this research, and choosing a strategy for data analysis that fully incorporates their perspectives into our findings is imperative. This inductive coding strategy accomplishes this. Also, a broad analysis of the conditions created by (attempted) climate adaptation, without narrowing on one specific consequence, supports our emphasis on multisectoral climate response schemes. A thematic analysis will provide us with the most personalized and multifaceted data for analysis.

The coding of our interviews will be broken into three categories. Consistent with thematic analysis, we will code based on: (1) Themes, (2) Subthemes, and (3) Meaning Units. The approach for such coding is bottom-up,²⁴ establishing meaning units—the collections of specific words or phrases from participants’ answers that feed into overarching patterns—first,²⁵ and then categorizing these meaning units into the subthemes. This method of coding is centered around and dependent upon participants’ answers, putting the Indigenous communities’ voices at the forefront of our analysis. With subthemes established, we will aggregate those into wider, more general themes. These “big” themes will be important when presenting our research

²² L. Ho and Limpaecher, A. “How to Do Thematic Analysis.” *Essential Guide to Coding Qualitative Data*, Delve. 31 Aug. 2020. <https://delvetool.com/blog/thematicanalysis>.

²³ Ho and Limpaecher, “How to Do Thematic Analysis.”

²⁴ Ho and Limpaecher, “How to Do Thematic Analysis.”

²⁵ Mojtaba Vaismoradi and Snelgrove, Sherrill, “Theme in Qualitative Content Analysis and Thematic Analysis,” *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 20(3), Art. 23, 2019, <http://dx.doi.org/10.17169/fqs-20.3.3376>.

findings later on since they are the broadest and easily digestible by an outside audience; this is key when considering how our research could be used to inform future multisectoral policy design.

Despite choosing an inductive coding strategy, we already anticipate a few themes in our research based on pre-existing research in other communities of developing nations and off on our theorization. We expect to see themes about identity, insecurity, and involvement. Identity refers to cultural identity, and how that may be challenged because of severed ties to homelands destroyed by climate change and industrialization. Insecurity refers to economic insecurity, and the readjustment of livelihoods or skills because of changes in location or representation. Lastly, involvement refers to political involvement and the extent to which Indigenous communities feel represented or heard by national and local governments in Papua New Guinea. These three themes will inform us on the effectiveness or feasibility of multi-sectoral climate adaptation approaches for Indigenous communities and climate refugees.

We also expect a theme, which we'll call "impact," that reflects the experiences of the indigenous individuals coping with the changes in their livelihoods from conservation policy, private sector investment, or economic policy. This theme will likely give insights to the effectiveness or trade-offs of policy in their implementation. However, it is ultimately up to the data and interviewees to confirm if these themes are indeed relevant to the population. When analyzing the interview transcriptions, we will develop our codebook as we comb through the data, going through each interview several times and refining the codes with each session.

Ethical Considerations

Due to the nature of our research question, we will be interviewing incredibly vulnerable populations. The IRB considers populations who are “economically disadvantaged,” “socially disadvantaged,” or “racial or ethnic minorities”²⁶ to be vulnerable subjects and special considerations should be made to ensure that the subjects are informed and are not being manipulated into participating. With this in mind, we will equip all possible participants with accurate information to enhance their decision-making capacity, such as information on the motivations, process, and possible consequences of participating in the study.²⁷ We will collect informed consent forms for each participant, and ensure that there is an open dialogue between the research team and participants about any concerns or updates, as necessary. In accordance with IRB requirements, we will protect participants’ privacy and confidentiality,²⁸ by creating participant ID codes that are uniform and contain no information or identifies about the participants’ identities. Finally, we will make it our priority to accurately and fairly represent our participants’ experiences in our analysis and research.

Data Analysis

When coding the interviews, we identified all four of the themes were expected to see. As seen in the sample transcript provided in the Appendix (item 1) for participant “John,” the different highlight colors correspond to each theme. Coded in red is “identity,” coded in green is “insecurity,” coded in blue is “involvement,” and coded in yellow is “impact.”

²⁶ Jena Fioravanti, “Vulnerable Populations,” *Institutional Review Board*, Swathmore College, Accessed 20 Oct. 2023, <https://www.swarthmore.edu/institutional-review-board/vulnerable-populations#:~:text=Neonates-Prisoners,mental%20disabilities%20or%20cognitive%20impairments>.

²⁷ University of California San Francisco, “Obtaining and Documenting Informed Consent,” *Human Research Protection Program*, 27 Sep. 2023, <https://irb.ucsf.edu/obtaining-and-documenting-informed-consent>.

²⁸ University of California San Francisco, “Obtaining and Documenting Informed Consent.”

We will be drawing upon the themes of lived experience from our interview. Our research focuses on gaining a deeper understanding of how Indigenous peoples in Papua New Guinea think about climate change, land use, and climate-caused migration. We also hope to see if these populations see the effect of government intervention. To achieve this, one of our questions asks if our interviewees can share how they see climate change impacting their daily lives. From our example transcript with “Kaimana,” we see that she experiences climate change daily and feels it threatens her people’s “traditional way of life”. This connects to a theme identified in our coding section of identity. As Indigenous communities see the effects of climate change and government intervention in economic projects in their lives, their identities are threatened as they are met with the prospect of having to move from their ancestral lands to survive.

We will also examine the theme of government encouragement for economic projects interfering with Indigenous use of land. For example, in our interviews, we asked Indigenous communities about the push of the Papua New Guinean government to expand the palm oil industry and how this affects them. From the interview with “Kaimana,” we see that she and her fellow villagers feel as if they are being pushed out of their land due to the deforestation of the nearby landscape for the industrial needs of the government. This reflects a theme identified in our codebook of insecurity. This is also reflected in our other transcript with “John” when he speaks about others having to leave their homes in search of ingredients that are now scarce and resettling elsewhere to have access to livelihoods. When asked about these government activities, “John” spoke about his desire for the government’s role to limit corporate use of the forest, seeing its role as protecting people’s access to the forest, and that he would feel more positively about the current projects if they had the same access to the forest. This ties a direct link with our

theme of equity and access, which are central themes of our inquiry and run throughout both our interviews.

Another theme from our codebook that we have found in our interviews is involvement, which reflects the level at which Indigenous communities feel heard or represented by the national government of Papua New Guinea. From our transcript with “John,” we see that the general feeling of the Indigenous communities is that land should be accessible to the public and that it is the responsibility of the government to ensure that companies do not overtake the land used by its citizens. Furthermore, “Kaimana” is more explicit in her interview, stating that the government’s decisions “often bypass our communities’ input”. As “John” describes the pressures of resettlement to be “very disruptive”, it shows how deeply Indigenous communities are being impacted thus necessitating their involvement if they want to maintain their way of life.

Lastly, we see the impact theme repeatedly in both interviews. Particularly in “John’s,” the participant identifies the impacts of economic policy, private sector investment, and trade policy as being “disruptive,” or uprooting. While we didn’t intend for this theme to only include adversity that the participants face, there was a constant prevalence of participants experiencing pressure or disruption in their communities. This connects to the feeling that the participants need to flee the place they’ve spent their whole livelihoods.

The repetition of these themes seen in our interviews is the best way to code them, as they touch upon all aspects of our research. The cultural identity of Indigenous peoples is important to discuss as it helps us understand the importance of the issue of climate change and economic development to the people who are being affected by the decisions of governments. Insecurity is also vital as developing nations are working towards eliminating the economic

insecurities of the nations as a whole as well as for their citizens. However, governments may not be aware that the actions they are taking are impacting their citizens negatively. Involvement is also an important theme to discuss as we have examined the strategies of success for the governments of developing countries in economic development involving effective communication between their public and private sectors as well as with their citizens.

Discussion

The expected findings of this study are that government economic needs and the needs of Indigenous communities impacted by climate change do not always see eye to eye. Poorer governments are concerned by their poverty and are developing economic projects to help bolster their economies. As we have expressed in our literature review, these motivations come into conflict with ways to mitigate climate change. Through our research, we expect to find that Indigenous communities value their relationships with the land and their right to live in the land of their ancestors more than economic projects.

The filling of this research gap introduces a layer of complexity to the issue of developing nations facing calls to help mitigate climate change but who also desire economic development to help boost their populations. Indigenous communities are unique populations with cosmologies that connect them to the land. It is expected that these communities will want to protect land for the use of their livelihoods in their traditional manner, as well as valuing the sustainability of life for generations to come. Naturally, we see this reflected in our primary interviews and expect this to be reflected in a full study.

The implications of such findings to the field of climate change and economic development create additional support for taking action to prevent climate change. Indigenous

voices speaking out about the care they have for the land gives climate change activists more support for their stance. This research also aids the understanding of previously unheard voices on the matter of land use.

These findings can also serve as a barrier to economic development projects of developing nations. For these nations, the improvement of their economies is vital in securing a progressive future for their citizens. However, this research implies that such development may not be beneficial for all citizens in these nations. Therefore, governments will need to investigate and see what kinds of economic development projects can be truly beneficial to all of their citizens.

Reflection

Our study felt natural in the questions we were asking and the answers we were receiving. The data we were looking for consisted of Indigenous responses to land use by governments. The interviews we conducted derived the data we were looking for, as we suspected that Indigenous communities would feel threatened by climate change and would place importance on their relationship with the land. As our data ended up matching our initial thoughts, our interpretation of the results was straightforward.

Our study may face issues as it relies on personal stories, which some may not take as seriously as quantitative studies. It is hard to quantify the value of being able to live by one's traditional values. Furthermore, participants may feel pressured to present their homelands in a certain way without fully addressing the extent of the issue and the policy impacts they would like to see. Deeper interpersonal relationships are needed to further evaluate potentially overlooked topics and outcomes. Although these problems may be present, we believe a study of

this nature would be important for amplifying and uplifting the voices of these communities in Papua New Guinea. The topic of climate change and its impact on vulnerable communities will only continue to grow in importance as climate disasters progress in the future.

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Appendix

1) Example of coded interview transcript description only *themes*.

██████ Hello! Nice to meet you today. Thank you so much for taking the time. To do this interview with us. What's your name?

██████ (he/him): My name is John.

██████ Hi, John. Thank you. And John. How old are you? And what do you do?

██████ (he/him): I am 24, and I work in my family's pharmacy.

██████ Do you live here? Have you always lived here?

██████ (he/him): Yes, I've always lived here

██████ Alright and how are you liking everything?

██████ (he/him): It's I like my home. I've liked living here.

██████ Yes. Do you have a lot of customers that come to your pharmacy?

██████ (he/him): We used to get a lot more, less so in more recent times.

██████ Are there any changes you notice that are causing that?

██████ (he/him): Nothing that I would say is too noticeable. Just some things. That I've heard my parents talk about.

██████ And how long have you been working at the pharmacy?

██████ (he/him): My whole life.

██████ Your whole life. Okay. Are you a pharmacist?

██████ No, I just assist with sort of gathering ingredients, sort of sourcing, and managing the store, day-to-day customer interactions.

██████ So today's interview, we wanted to ask you a few questions. I wanted to ask you a few questions not pertaining to your business so much, but just about the region that you're living in. We're just wondering there's tons of forest here. This is one of the largest forest areas in the world. Have you noticed? Or are you concerned at all about forest loss?

██████ (he/him): Yeah, actually, I think it's sort of played a part in my family's ability to do business. I think deforestation is an issue.

██████ Can you elaborate a little bit more on how it's affected your family's business?

██████ (he/him): Yeah. A lot of the medicines that my family uses in our pharmacy are herbal-based, and so we often rely on the vegetation within the forest as a form of medicinal practice, and because of deforestation, we haven't had access to the same medicinal plant. So if used previously.

██████ I see. And are you just not making those medicines? Or have you been like importing finding out the ways to source that ingredient?

John: For some sort of solutions it's been **we've outsourced**. We've had to **import foreign ingredients**. But for other types of medicines, we just **haven't been able to produce** that

█ I see. And as you're producing this like medicine, do you have your own plot that you're growing the herbs in? Or is it more like wild herbs that you're like foraging for? How does that work?

█ (he/him): It's more so **foraging**.

█ foraging. And are you just finding less of the available? Yes, and are there any kind of restrictions on what you can use, or where you can go? Forage?

█ (he/him): Personally? No. But I have heard. There are **other pharmacists who are suffering similar issues**, and I've heard through the grapevine that people have **not been able to access certain parts of the forest that they used to be able to**.

█ Do you know why they aren't able to be accessed anymore?

█ (he/him): Just some **fake language regarding you know companies**. I'm not too familiar with it.

█ Okay, so is it like private land that you can't go into?

█ (he/him): Or no, I think it's public land? I think it's **land that we've always gone to**.

█ Thank you for that. So we're gonna switch topics a little bit. I'm going to ask you about a few different themes that are particular kinds of policies or other business practices that have been released. So no worries, if you don't know about it. You've never heard about it, but if you do I like to ask your thoughts on it as well. So if one of the things we wanted to learn more about is, have you heard about the Merauke integrated food and energy estate?

█ (he/him): No, I have not.

█ And how do you generally? So what that is is they're taking a lot of the forest land to develop other projects, and etc. So we're wondering, like, How do you feel about it? Because you mentioned kind of losing that place? For the herbs and the cultivation and the foraging resources? How do you feel about these kinds of large land-use projects that are happening around you?

█ (he/him): I think it's tough because obviously they have their own motivations. But I think **I would be more inclined to have more positive feelings towards them if we had the same access to the forest** if we had the same access to goods. I think the forest deserves to belong to everyone, and so I think I take issue with the fact that **parts of the forest are being sort of sectioned off from people who have previous access to it**.

█ And who do you think, should have access to the land?

John: the forest, I think everyone, **I think everyone should have access** that's coming later as well. I think **companies should have access as long as they do their part, to protect sort of endemic and pre-existing forest life**.

█ Alright so the next declaration we're gonna ask you about is the Manokwari Declaration? Signed in October of 2018? Do you have any memories of that?

█ (he/him): No.

█ okay. So that was a joint declaration with the Government. Of trying to kind of designate how land, and indigenous rights. Will be purpose. So like, basically who has property rights? So if the government is kind of managing the land and dictating who has access to it, and who has the governance and the property rights over that. So how do you feel more generally about the government being involved, or other policymakers?

█ (he/him): I think the Government should be involved to the extent that they make sure that companies don't overtake the forest and sort of block out other populations. I feel like the Government should be there to protect the forest and protect people's access to the forest

█ From the government actions that you serve around you. Do you think the government's actions are helping protect the land? For your use? Or your family's or communities' use? Or do you think that's actually limiting your use?

█ (he/him): It's hard to say I don't know if there's a sort of cause and effect from the government actions versus what I've seen. I just think that current conditions should be better.

█ Are there any things that you would like to see change or see the government be involved in or not be involved in?

█ (he/him): I think that the government should have a stronger hand in curbing corporations. Power in terms of dictating which parts of the forest quote unquote, belong to them.

█ Alright, thank you. And your relationship with the land. You know your home has changed? Cause you're you're you mentioned that you're not getting quite the access or the volume of the plants that you need for the business. And so has. There have been any other ways that you've noticed changes in your land, your daily life, or any interpersonal events?

█ (he/him): Well, yeah, I think due to deforestation and due to access to source materials that we use for our medications. I think my parents' business has taken a financial hit. I think. We've suffered financially as a result of that but secondarily, I think the community of foragers, the community of people who use herbs as medicine. I think that the community has broken down due to a lack of a communal space within the forest.

█ Hmm, so do you notice people like not coming to the pharmacy as often or like not using kind of these resources? Is that what you're saying?

█ (he/him): Yeah.

█ hmmm! And are where, do you know are like, are people leaving their homes? Or are they going to places?

█ (he/him): I think people, I think I've heard of people who have had to leave their homes to go to other places to try and find similar ingredients.

Gerlin: Are they settling, or are they coming back? Are they just like getting the greetings and coming back? You know, to continue in this community? Or are they kind of picking up their life? And, you know, starting a new business in the new location.

█ (he/him): The people who I have noticed have left have not returned. So I'm assuming that they've settled elsewhere.

█ And do you know how long ago that was, or how long it's been since they left? Yeah, I'd say a few years, a few years. And do you notice that trend increasing or decreasing?

█ (he/him): I don't think, I'm not sure, I've noticed a real trend.

█ okay, and do you feel any pressure cause you mentioned that your family business is suffering a bit? Do you feel any pressure to also take that approach to maybe having to go somewhere else?

█ (he/him): Yeah, I think there's a pressure. I think that's definitely caused some division within our own family in terms of you know who in the family wants to stay versus? Who wants to go?

■■■■■ Hmm! And how do you feel about that?

■■■■■ (he/him): I feel angry and sad. That **I'm losing this connection to my home** and that there is sort of a **sense of pressure to sort of vacate** this place that we've called home for so long.

■■■■■ and if you were to resettle or to have to move would you continue the family business? Would you have to find a kind of find another source of income. How do you think that will play out?

■■■■■ (he/him): I think I would hope that we would be able to sort of **use the skills that we already have**. But I think if it came down to it, I think if we had to adapt and sort of take up new skills or take up a new business. I think we wouldn't, we would.

■■■■■ And then, lastly, more kind of more generally. How do you view having to resettle? Migration due to your loss in the environment, all access, resources whether due to companies, private privatization of land, land, use, or to more like natural disasters or climate change?

■■■■■ (he/him): I think it's very **disruptive**. I think a lot of people have had similar experiences to me where they've sort of felt that **loss of connection to a sense of home**. And sort of **lives have been uprooted**. I think it's very disruptive, and I feel like it is **fundamentally changed the way communities I've sort of formed**.

Gerlin: What do you think in your opinion, are ways that either the international community or businesses can be most helpful?

■■■■■ (he/him): I think they can **support our communities by giving us money to sort of facilitate resettlement**. If you know, if we **have to pay out of pocket**, that's really difficult. Or they could sort of put pressure on companies to be better about their use of land.

■■■■■ Okay, thank you. I see. And is there anything else you would like to add that you know our conversation made you think of that my questions didn't get to?

■■■■■ (he/him): No, no thoughts.

■■■■■ Thank you so much for your time.

■■■■■ (he/him): Of course.

Climate Change Policy Implementation in Weak Institutional Environments

INTRODUCTION

Climate change and its effects present a unique and pernicious global challenge. Just a handful of wealthy countries have contributed the majority of cumulative global CO₂ emissions, while poor countries struggle to find economic development strategies that do not rely on heavy emissions. Leaders of poor countries struggle to balance the immediate concerns of poverty reduction against the persisting concerns of climate change. Adding to the difficulty, international and domestic political processes frequently set climate change aside as a “scientific,” rather than “societal” issue, cutting crucial policymakers out of the loop. Amid this backdrop, global temperatures rise at a blistering pace, threatening environmental and economic stability and putting human lives in danger (Hausfather 2023).

Developing countries face a unique set of challenges in adapting to and mitigating climate change, due to limited financial and technical resources and their reliance on climate-sensitive sectors such as agriculture and commercial fishing. Their citizens tend to be poorer and more insecure, with less capacity to adapt to external shocks. Developing countries also face pressure from wealthy countries and international organizations to embrace so-called “green” development strategies.¹ A global approach to climate change policy accounts for the inequities among countries, tailoring its recommendations to the capabilities and debilities of each participating country.

The literature on global climate change policy asks what policy solutions are appropriate and effective to reduce global carbon emissions and prepare and protect the globe from the already-changing climate. The prescribed policy solutions are as broad and diverse as the challenges they seek to overcome. Some question whether the institutional frameworks exist to implement effective policy solutions (Ojha 2016). Many caution against the hypocrisy of wealthy countries demanding that poorer countries not exploit their own fossil fuels, and others

¹ <https://www.oecd.org/greengrowth/whatisgreengrowthandhowcanithelpdeliver sustainable development.htm>

recommend that international scientific experts consult with local leaders to find locally appropriate solutions (Sovacool 2016). The literature demonstrates that policy is a context-dependent endeavor (McArthur 2022, p. 14). Where the literature falls short is in producing specific policy recommendations for specific policy contexts. The next step is to move beyond merely showing *that* context matters and instead studying *where* a certain policy is most likely to be effective. This paper seeks to fill this gap and determine the most effective set of climate change policies in developing countries with weak institutional environments. Put differently, we ask: what sorts of policies are most likely to improve the climate change crisis, either by limiting carbon emissions or making communities more resilient to its effects, in countries with low quality governance? Are there effective policies that do not rely on strong institutions?

This paper begins with a review of five articles that engage the topic of global climate change policy. The articles vary in scope, but all demonstrate that developing countries' participation is essential in a global climate strategy. Then, the paper builds a theoretical framework of climate-related policy and domestic political struggles. Next, we prepare to gather qualitative data on how various climate policies perform in different institutional contexts, considering cases of success and failure. Finally, we analyze our data and evaluate which types of policies are most likely to find success before our concluding remarks.

LITERATURE REVIEW

The five articles we reviewed for this paper highlight the challenges of climate change policy implementation in developing and low-income countries. An underlying theme in the literature is that developing countries are crucial to the global effort to meet climate goals and that equitable pathways are central to net-zero emissions, climate adaptation, and protecting natural capital (Battacharya et al., 2022). The challenge, though, of effectively implementing climate policy in developing countries, was that such countries had low adaptive capacity to react to climate change or shore up resistance to vulnerabilities that would be exacerbated in those countries by climate change (Mertz et al., 2009).

One particular vulnerability stood out as we examined climate policy implementation in Jordan, Nepal, and Ecuador. In each of these developing countries, governance limited the success of

climate policies. In Nepal, a country characterized by political unrest due to social exclusion, Ojha et al. (2015) critiques the lack of inclusion of vulnerable groups in climate policies and makes the case that climate policies must address the real world contexts of developing nations with instability in its governance. Al-zu'bi (2016) also focuses on the government and argues that successful implementation of climate policy in Jordan relies on better governance tools and improved cooperation between the government and stakeholders. Sovacool and Scarpaci (2016) examine Ecuador's failed Yasuní-ITT Initiative, which offered to leave oil underground in the Amazon rainforest in exchange for billions of dollars in international funding, flipping the oil industry on its head. The Yasuní-ITT initiative struggled in part due to friction between governmental departments and international partners, and highlighted the challenges of developing countries in balancing economic and social development with climate-friendly growth. These cases emphasize that the most effective way to prepare developing countries for the impacts of climate change is through a holistic approach that integrates climate adaptation into broader development agendas (Mertz et al., 2009).

This literature also reveals one main gap in research on this topic. The literature falls short when identifying specific government implementation strategies and effective policies that will strengthen cooperation between governments and stakeholders. Multiple authors argue that broad development agendas with climate policy implementation will prove to be the best strategy for climate adaptation, but fail to provide specific examples of such strategies. The research raises several important questions. What are the structural issues in developing countries that need to be addressed in order to effectively implement climate change policy? Which policies work in developing states with weak governance?

It is important to continue to study these issues because implementation of robust climate policies in developing and low income countries is a crucial step toward reaching climate policy goals. Furthermore, without successful climate adaptation policies in developing countries, they will soon face serious problems adapting to the impacts of climate change which will negatively impact the further development of these countries.

THEORY

Institutions are the established rules and norms that govern human behavior within a society (North 1990). Countries with strong institutions are better able to implement and enforce complex climate policies, which help ensure compliance and lead to long-term policy success. In contrast, countries with weak institutions struggle to address environmental challenges due to shortcomings in governance and regulation (Ionata 7-8). In this study, we focus on the countries with weak institutions. While some recent work concludes that institution-building is a necessary condition for climate policy implementation, we argue that an institution-first model ignores the importance of policy design (Khan 2020, p. 9-10). Instead, we show how policy design is a crucial mediating factor between institutional strength and policy outcomes.

Institutions with strong bureaucratic characteristics exhibit a clear hierarchy, well-defined roles and responsibilities, and a rule-based system of governance (Weber, 1947, p. 333-334). These organizations prioritize the application of impersonal rules and procedures to achieve efficiency and consistency in decision-making processes. Institutional strength, therefore, refers to the capacity of an institution to establish and maintain such a rational-legal authority, facilitating the implementation of policies, the enforcement of regulations, and the execution of functions with consistency and predictability. We follow Fukuda-Parr and define institutional strength as “the ability to perform functions, solve problems, and set and achieve objectives” (2002, p. 8).

Countries with weak institutions struggle to develop effective public policy (Spiller & Tommasi 2003, Levitsky & Murillo 2009, p. 125). Weak institutions are comparatively less capable of policy implementation and enforcement and suffer from a lack of technocratic expertise that is necessary to steer complex policies. Specifically, our study focuses on countries where the public bureaucracies charged with economic management, environmental protection, and social welfare are poorly funded and historically politicized. This includes regulatory, legal, and judicial institutions. We restrict our universe of cases to countries where these institutions are weakest and ask: what policy designs are most likely to be effective given severe institutional constraints?

Policies are not random, and some are more likely to succeed than others because of their design. We expect that climate change policies that consider autochthonous challenges and opportunities are more likely to succeed than policies that are simply copied from one environment to another. Our goal is to identify the best policy designs for countries with weak institutions. Countries with

weak public institutions face a different set of challenges to policy implementation than countries with historically strong and capable public institutions. Skocpol (1985, p. 7), following Weber's conceptualization of the state, writes that “administrative and legal” organizations are at the “core of any state.” We agree with this view and argue that the state's administrative and regulatory bureaucracy is crucial for implementing effective climate change mitigation and adaptation policies. But when state capacity falls short, what policies are most likely to be successful? This question vexes global climate policy experts and is the core of our research agenda.

To show that we have a basis for comparison, we will assess the impact of climate policies on carbon emission reduction, increased adaptive capacity, and any improved environmental conditions using metrics such as mortality rates, crop yields, and infrastructure improvements. We will compare these measurable outcomes to the stated goals of the policy at the time of its implementation. A policy that meets or exceeds its stated goals will be considered successful, while a country that fails to meet most of its stated goals will be considered a failure. We will conclude the study by developing our theory of change utilizing the lens of the local context and stakeholders and develop a theory of how these policies (carbon reduction, adaptive capacity, and improved environmental conditions) have worked and which policies are the most effective in the developing nations with weak institutional structures.

Effective climate policies in developing countries require a holistic approach that integrates adaptation and mitigation efforts to build resilience, considering local governance quality and the required institutional capacity-building efforts. Climate resilient development strategies contribute to both mitigation and adaptation efforts. The impact of governance quality on local-level adaption is significant, emphasizing the need for context-specific policies. Measurable outcomes and well-defined theory are crucial for comprehensive policy assessments.

RESEARCH DESIGN

To understand the complexities of policy implementation in weak institutional environments, we use paired case studies with elite interviews. We compare a successful case of policy implementation with a failed case, holding constant confounding variables. We then interview

policymakers to elucidate the policy selection and implementation process. This design allows us to identify the policy design elements that contribute to success.

We use a most similar systems (MSS) design in our case studies. This design, based on John Stuart Mill's Method of Difference, holds all variables constant except for the variable of interest (Przeworski and Teune 1982). Logically similar to the large-N method of matching, MSS designs depend on identifying cases that are as similar as possible, except that they differ along the independent variable (Seawright and Gerring 2008). In practice, it is difficult or impossible to find truly identical cases. However, cases that share similar histories, relative economic parity, and close political affinity are generally good candidates for most MSS case studies. Conversely, cases that differ along a theoretically relevant confounding variable are not suitable for MSS design. In our study, we study climate change policy implementation in two similar countries. In one country, the policy was successful, and in the other, it failed.

When analyzing the policy provisions of our case studies we will identify common objectives for good climate governance and consider whether each case applies these objectives. The field of climate governance is broad and there is a deep variety of literature. However, most agree that there are four main objectives for effective environmental governance success. Environmental policies should be; effective, equitable, responsive, and robust (Bennett and Satterfield 2018). When analyzing the policy texts we will determine the effectiveness by looking for certain attributes: clear direction, coordination, capacity, information availability, and accountability. In evaluating the equitability of these policies we will focus on whether the policies are; inclusive, participatory, fair, and just. Additionally, to determine the responsiveness of the policy we will look for monitoring and evaluation, adaptability, innovation and flexibility of the policy. Lastly, to evaluate the robustness of the policy we will look at whether the government policies and institutions are legitimate and connected. As well as whether the primary institution is nested in a government decision-making authority while also being decentralized for institutional diversity.

Interviews of elite policymakers will help explain the policy selection and implementation process and assist in identifying why the climate policies succeeded or failed. They help elucidate the “black box” of causality by revealing the mechanisms that link the independent and dependent variables (Falleti and Lynch 2009; Gerring 2008). Interviews with those that helped

select the policy provide a check against the alternative explanation that a third, “hidden” variable explains both the choice of policy and its outcome.

DATA COLLECTION, INSTRUMENT DESIGN, CODING, & DATA ANALYSIS

The countries selected for our paired case studies are countries with weak institutions, with low stability and low enforcement of institutions (Levitsky and Murillo 2009). Countries with low stability experience more frequent changes to institutions (such as formal rules) compared to other similar countries. Enforcement refers to the practical behaviors associated with rules: whether they are enacted, enforced, or ignored. To conduct our research for the paired case studies, we will collect and analyze news articles, policy documents, and economic and/or climate data documenting the outcomes of the climate policy. Policy documents and economic or climate data before and after the policy implementation will be compared and analyzed to understand the conditions under which the policy was implemented and to evaluate the effectiveness of the climate policy. Since our research primarily concerns weak institutional governments, qualitative analysis of the institutional environment will be necessary to understand the context under which the policy was implemented.

Interviews will be conducted to supplement the policy documents and quantitative data gathered. Interviews will be conducted with policymakers directly involved with the design, selection, and implementation of the policy, focusing on policymakers’ efforts to gain financial, political, and popular support for the policy, the challenges faced by the policymakers, and on their efforts to mitigate those challenges. One-on-one interviews will be conducted with open- and close-ended questions tailored to the participant. Interviews will be recorded, translated, and transcribed.

Interview Questions

1. What drove your interest in developing this environmental project?
2. What did you hope to achieve with this project?
3. Were you driven by any or all of the pressures of a need to improve the environment, politics, economics, widespread approval, or other forces we have not accounted for?
4. How heavily did any of these considerations weigh your decision to proceed with the project?
5. What factors led to the decision to pursue this specific project?
6. What were your feelings about the project before it began?
7. What obstacles did you encounter during the operation of the project? If the project is still active, what obstacles have you encountered?
8. What were the specific results of the project?
9. What would you have done differently, given a second chance to develop another environmental project?

Figure 1: Questionnaire for semi-structured interviews

We designed our questionnaire to elicit responses from selected national elites on their opinions regarding the selection, the process, challenges faced, and the assessment of environmentally focused projects supported in their region. Considering their societal position or involvement in the project reviewed, elites will be selected. The potential list of interviewees could include national political leaders, local community leaders, project managers, developers, environmental activists, and any additional key figures in the decision or execution of the project in question.

For the coding process for the interviews, there are several themes we are expecting to develop in the answers: Working with other countries, political motivations and outcomes, costs and economic benefits. The actual themes that develop will come from the coding process of responses. We will be coding for patterns, and looking for any overlapping of responses from interviewees from both countries. The coding process will take the work of at least two people. Having more than one person work on the coding will help improve the quality of codes, help counteract bias from an individual, and bring in creative perspectives to the coding cycles.

Before the first cycle of coding, we will highlight phrases in responses that stand out as surprising, powerful, or controversial. We will start doing this right after the interviews have been transcribed and translated, because we want to keep in mind how long we will remember the experience of interviewing the key figures. We will also explain any key acronyms as needed

and make language clear. The first cycle of coding will be taking responses and coding to describe responses in short phrases, and the second cycle will shorten the phrases.

The second cycle coding method will be pattern coding, because it is suitable for interview transcripts, and evaluation coding because the interview is about the “merit and worths of the program or policy”(Saldaña 2009, p. 102). After the second cycle of coding, we will start to put together categories and subcategories by grouping codes. Theming will happen after the coding cycles. After coding, we can reflect and pull out the codes that stood out the most from answers to questions.

Data collected on the countries before and after the policy implementation will be analyzed to determine to what extent goals were met, and if goals were met partially. In analyzing the case studies and interviews, we will codify the data into different categories and each case will receive a score from 1-5. A score of 5 will represent the top score representing policy success in the category, and 1 representing no success in the category. Since the coding process is cyclical, we will go through the coding of responses more than once. Success will be evaluated based on the average score of the interview in each category, an average score above 3 will be evaluated as a successful implementation whereas an average score below 3 will be considered a weak implementation of the policy.

The research will be conducted with subject stakeholders in two countries. We will speak with policymakers, political leaders, and other individuals that took part in selecting, designing, and implementing the policies examined in our paired case studies. The protection of individuals participating in this study is paramount. Using the method of in-person one-on-one interviews is considered a minimum risk; that does not mean there is no risk for our team to mitigate. The interviews conducted during this study will be in person subjects known to the researchers. Subjects will be over the age of 18, will have signed an informed consent waiver in a language that the subject understands, and will have had the opportunity to review and have any questions addressed to the satisfaction of the subject. Names of the participants will not be published.

Before the interviews are conducted, translations of the informed consent waivers will be confirmed for their accuracy by two independent vetted sources. This will ensure the waiver uses easily understandable language to concisely explain the study and emphasize that participation is

voluntary. Data collected will be stored on a dual verification platform, tracked to identify researchers' times of entry of data and any replication or sharing of the data.

DATA ANALYSIS

The coding scheme used for this research will be based on three different coding strategies as outlined in Table 1. We will use magnitude coding and process coding as strategies to code our data in the first coding cycle. In the second coding cycle we will use pattern coding to identify themes and patterns in our data (Saldaña, 2009). These are the most effective methods for our data as we are looking for patterns indicating positive processes resulting in successful implementation of climate policy. Each interview will be coded using these methods as indicated in Table 2. For the magnitude coding, a list (see Table 3) of keywords was created based on anticipated responses from interviewed elites that indicate significant motivation behind actions. When conducting this data, analysis focus will be on finding significant patterns and themes in the interviews as well as whether quantitative findings align with interview responses. It must be noted that interviews conducted with policymakers will be characterized by biases and incomplete information. Therefore, it is of importance to also evaluate how interview responses overlap with quantitative findings and whether differences exist.

Table 1: Coding Strategies and Application in Interviews

Coding Method	Application
First Cycle: Magnitude coding (Saldaña, 2009, p. 66)	Used to code interview responses to allow us to analyze and compare responses between case studies and participants. For example, in evaluating participants' perception of motivations and circumstances as positive, negative, neutral, or mixed.
First Cycle: Process coding (Saldaña, 2009, p. 82)	Applied to responses in our interviews that identify actions taken to implement either successful or unsuccessful climate policies in the countries and regions of our interviews. Examples are "promoting", "creating", and "implementing".
Second Cycle: Pattern Coding (Saldaña, 2009, p. 154)	Used in the second cycle to identify patterns and themes. In this study we use it to search for rules, causes, and explanations in the data.

Table 2: Interview Coding Strategy

<p>Interviewer: What were your feelings about this project before it began?</p> <p>Minister [REDACTED] My feelings about the solar expansion project before it began were a mix of ⁹³ optimism, determination, and a sense of responsibility. ⁹⁴ Optimism stemmed from the project's potential impact on ⁹⁵ mitigating climate change and ⁹⁶ promoting sustainable practices. There was a ⁹⁷ resolute determination to drive positive change in the country's energy landscape, ⁹⁸ aligning with long-term national goals. As a government official, I felt a ⁹⁹ sense of responsibility to make decisions that would have a ¹⁰⁰ lasting impact on the ¹⁰¹ nation's energy security, ¹⁰² economic development, and ¹⁰³ environmental well-being. ¹⁰⁴ Strategic considerations and an awareness of ¹⁰⁵ potential challenges were also part of the emotional landscape.</p>	<p>⁹³ POS. MOTIVE</p> <p>⁹⁴ POS. MOTIVE</p> <p>⁹⁵ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>⁹⁶ IMPLEMENTING POLICY CHANGES / POS. MOTIVE</p> <p>⁹⁷ POS. MOTIVE</p> <p>⁹⁸ WORKING TOWARDS POLITICAL GOALS / POS. MOTIVE</p> <p>⁹⁹ POS. MOTIVE</p> <p>¹⁰⁰ POS. MOTIVE</p> <p>¹⁰¹ LEAVING A PERSONAL LEGACY / POS. MOTIVE</p> <p>¹⁰² POS. MOTIVE</p> <p>¹⁰³ POS. MOTIVE</p> <p>¹⁰⁴ POS. MOTIVE</p> <p>¹⁰⁵ NEG. MOTIVE</p>
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Table 3: Magnitude Coding Keywords

Magnitude coding list for interviews:
Resistance, opposition, hurdles, challenges, responsibility, strategic, optimism, engagement, diversification, opportunities, expansion

Based on the interview we conducted (see Appendix), we completed one cycle of coding. However, since we expect that further interviews conducted will include less redundancy and yield more detailed, substantive answers specific to the policies we are studying, we anticipate that subsequent cycles of coding will result in a more accurate depiction of patterns found across interviews on what contributes to successful or unsuccessful climate policies. After coding additional interviews and additional cycles of coding, we plan to adjust our analysis by observing policymakers' motivations, strategies, and attitudes towards their policies as categorized by specific sectors: political, economic, civic, and environmental. Observing levels of positive and negative motivation in these sectors, as indicated by frequency of codes, will help us understand the themes that are common in successful climate policy. As such, the second cycle of coding

found in our coding strategy will be conducted after gathering a larger sample of interviews from which we can observe more substantial patterns.

Considering the questions we prepared for our interview, the major themes and concepts we expect to draw from our interviews are related to the economic, social, and political motivations and circumstances of the climate policies. We expect that successful climate policies will include compelling economic benefits that drive the policy towards success despite a country's weak institutions. Participants are likely to mention the economic impacts and motivations of the policies they implement. In this vein, one of themes we expect to find in successful policy is growth that is tangible for the community and policy implementers. A shift to sustainable climate policies is more likely to be successful if the impacts of the policy can be immediately felt, for example through the creation of jobs or a decrease in electricity bills, and discussed in interviews if those impacts are felt.

Another theme we expect to see in successful climate policy is that funding is reliable to sustain the implementation of the climate policy. For example, the shift to solar energy in Nicaragua is dependent on a sustained partnership between the Nicaraguan government and solar companies to fund the shift to solar energy for individuals and organizations. The converse, disruptions to funding by way of corruption or other factors in weak institutions, is a theme we anticipate seeing in interviews on unsuccessful policies.

Other major themes we expect to see are that climate policy is a priority on the government's agenda and that the climate policy is perceived positively by the community and policymaker. The prioritization of policies provides insight into the political support and climate that policies operate under. Furthermore, since these case studies feature weak institutions, the interaction between communities and their governments or institutions are key in evaluating the policies. Does the government partner with key leaders or organizations in the community to implement or promote the policy? We expect that some of our interviews will provide insight into this dynamic.

DISCUSSION

The data we collected shows three tentative but promising implications for climate policy design in poorly institutionalized environments. Policies that create a financial burden for those who must comply or depend on technically complicated monitoring schemes are not likely to succeed where institutional strength is low, but our study shows that promising alternatives exist. Rather than relying on large public bureaucracies to implement and monitor policy, the Nicaraguan case shows that policies that rely on pre-existing economic incentives, obtain buy-in from key political stakeholders, and create a long-term plan are three important policy design choices that positively impact the likelihood of success.

First, policies that consider underlying economic forces to make compliance in the best interest of stakeholders are more likely to succeed than policies that create economic losses. While strong institutions may be able to regulate and monitor actors for compliance, weak institutions are comparatively less able to do so. Minister [REDACTED] articulated this design choice clearly when he said “...by investing in renewable energy infrastructure, the government aimed to attract private investment, boost economic growth, and create sustainable employment opportunities...” Solar energy policy is not inherently costly or profitable, but depending on the design of the policy, it can be made to be so. Policies that subsidize risk and adopt “carrot,” rather than “stick” incentives for actors are more likely to be successful.

Second, policies that adapt to local political realities are more likely to be successful than those that do not. In Nicaragua, this meant rewarding political allies with lucrative contracts. In fact, during our interview, Minister [REDACTED] revealed a clientelist decision-making process, admitting: “The strategic choice of a geographic region known for its support of the current administration was influenced by political considerations.” Here, the Minister shows that the project’s location was chosen where the administration’s supporters live. To many in the international development community, such brazen clientelism like this may be unsavory or sufficient reason to cut partnerships or funding streams, but the lesson of this paper argues that if climate policies are to be successfully implemented globally, they must adapt to local conditions. In Nicaragua, this means adapting to standard political practices, which includes corruption, clientelism, and patronage networks. It is true that many resources may not be fairly or efficiently distributed under this system. But as the results in Nicaragua demonstrate, policymakers sometimes must choose between a policy that yields flawed results and one that yields no results at all.

Third, policies that have a plan for long-term continuance are more likely to succeed than policies designed for the short term. Ironically, this design feature is more compatible with authoritarian regimes with stable long-term leadership than to democratic regimes whose leadership changes with regularity. In Nicaragua, for example, the Ortega administration has been in power since 2007, and has engaged in antidemocratic practices to solidify control and eliminate political opponents. While detrimental to democracy, human rights, and liberal values, this has ironically permitted some policy stability in Nicaragua over the last 16 years. In countries where liberal democracy and free and fair elections are not the dominant system, but institutions are also weak, as they generally are in Nicaragua, policies that plan for the long term are more likely to yield success.

Our evidence confirms what is already widely known: that effective climate policy adapts to local conditions rather than applying a one-size fits all policy solution to all problems. But our study goes further and suggests that three design features in particular are most likely to be successful where institutions are weak. We expect that two of these policy design elements may be distasteful for many policy professionals, who hold normative preferences for liberal democracy. Our results suggest it would be effective to refocus priorities and compartmentalize distinct issues. This means, for example, that some climate policies may not be democracy-building, and some democracy building policies may not be climate-conscious.

REFLECTIONS

This essay began by demonstrating the difficulty of designing effective climate policy in a complex world. Countries encounter a myriad of climate-related challenges, each unique in its nature, and their abilities to address these challenges vary widely. Simultaneously, the specter of climate change looms larger, posing an escalating threat to nations irrespective of their economic standing—jeopardizing geographic borders, economic prosperity, and even human survival. From the beginning, our objective has been to propel the discourse beyond acknowledging the need for customized policy solutions to address local challenges. Within this essay, we have expanded upon crucial findings from the literature on institutional strength, delving into the examination of which policy designs, if any, stand a chance of success in contexts where institutions are inherently weak.

Our essay assumes the existence of a country's institutional framework and develops a theory regarding which design options can thrive within that context. Clearly, strategies relying on a large, professional Weberian bureaucracy are unlikely to succeed in a country like Nicaragua. Up to this point, existing literature has either advocated for the gradual strengthening of institutions, a time-consuming process, or suggested the adoption of contextually appropriate policies, offering somewhat vague guidance. This essay introduces three design elements that remain resilient in the face of a weak institutional environment. We aim to stimulate further research on this crucial subject, enhancing our data through additional case studies, diverse institutional arrangements, and exploration of potential design features. Ultimately, this endeavor illustrates how meticulously chosen, well-crafted policies can navigate political obstacles and enhance human well-being.

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APPENDIX:

Interview Transcript & First Cycle Coding:

Interview with Nicaraguan Minister of Energy and Mines, [REDACTED] on the successful solar expansion project in Nicaragua, particularly focused on a geographic region known to support the current administration led by President Daniel Ortega.

<p>Interviewer: Good day, Minister [REDACTED]. Thank you for joining us today to discuss the solar expansion project in Nicaragua. Can you share what drove your interest in developing this environmental project?</p> <p>Minister [REDACTED]: Certainly. The interest in the solar expansion project stems from our government's commitment to ¹ promoting sustainable and clean energy sources. We aim to ² reduce the environmental impact of traditional energy generation. Solar energy, being renewable and clean, ³ aligns with our goal to ⁴ decrease reliance on fossil fuels and ⁵ mitigate the effects of climate change. The project also offers significant ⁶ economic benefits, ⁷ creating job opportunities, ⁸ stimulating local economies, and ⁹ attracting investment in the renewable energy sector. The ¹⁰ reduced dependency on imported fossil fuels ¹¹ contributes to energy independence and ¹² enhances economic resilience. The Matagalpa region's ¹³ support for the current administration reflects a ¹⁴ strategic decision to ¹⁵ garner political backing for the project, ¹⁶ facilitating smoother implementation.</p>	<p>¹ PROMOTING SUSTAINABILITY/ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>² ADDRESSING CLIMATE CONCERNS / POS. MOTIVE</p> <p>³ WORKING TOWARDS POLITICAL GOALS / POS. MOTIVE</p> <p>⁵ NEG. MOTIVE</p> <p>⁶ ECONOMIC BENEFITS / POS. MOTIVE</p> <p>⁷ ECONOMIC BENEFITS / POS. MOTIVE</p> <p>⁸ ECONOMIC BENEFITS / ATTRACTING FUNDING / POS. MOTIVE</p> <p>⁹ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>¹⁰ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / NEG. MOTIVE</p> <p>¹¹ ECONOMIC BENEFITS / POS. MOTIVE</p> <p>¹² ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>¹³ GAINING POLITICAL SUPPORT / POS. MOTIVE</p> <p>¹⁴ GAINING POLITICAL SUPPORT / POS. MOTIVE</p> <p>¹⁵ POLICY IMPLEMENTATION / POS. MOTIVE</p> <p>¹⁶ GAINING POLITICAL SUPPORT / POS. MOTIVE</p>
<p>Interviewer: What did you hope to achieve with this project?</p> <p>Minister [REDACTED]: With this solar expansion project, our goals were multi-faceted and backed by quantifiable objectives. Firstly, we aimed to significantly ¹⁷ increase the country's capacity for renewable energy, specifically targeting a 30% rise in</p>	<p>¹⁷ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>¹⁸ PROMOTING SUSTAINABILITY / POS. MOTIVE</p> <p>¹⁹ PROMOTING SUSTAINABILITY / POS. MOTIVE</p> <p>²⁰ PROMOTING SUSTAINABILITY / POS. MOTIVE</p> <p>²¹ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / NEG. MOTIVE</p> <p>²² POS. MOTIVE</p>

<p>solar power generation by 2020. This ¹⁸ aligns with our broader vision of ¹⁹ transitioning to a more sustainable energy mix. Simultaneously, ²⁰ achieving energy independence was a pivotal objective, with a quantifiable target of ²¹ reducing reliance on imported fossil fuels by 20%, thereby ²² promoting national security and ²³ stabilizing energy prices. The project also sought to ¹⁰ create tangible economic impacts by ²⁴ generating a minimum of 5,000 new job opportunities and injecting \$50 million into local economies. ²⁵ Empowering communities was measured through a goal of ²⁶ increasing local solar ownership by 15% within the project's timeline. ²⁷ Diversifying our energy sources was vital for a ²⁸ stable and secure energy supply, with a quantitative target of ²⁹ reducing vulnerability to global fuel market fluctuations by 25%. Additionally, the project ³⁰ contributed significantly to our national goal of ³¹ achieving 90 percent of electricity generation from renewables by exceeding the interim target of 40% by 2015.</p>	<p>²³ ECONOMIC BENEFITS / POS. MOTIVE</p> <p>²⁴ ECONOMIC BENEFITS / POS. MOTIVE</p> <p>²⁵ IMPACTING INDIVIDUALS / POS. MOTIVE</p> <p>²⁶ IMPACTING INDIVIDUALS / POS. MOTIVE</p> <p>²⁷ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>²⁸ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>²⁹ NEG. MOTIVE</p> <p>³⁰ WORKING TOWARDS POLITICAL GOALS / POS. MOTIVE</p> <p>³¹ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p>
<p>Interviewer: Were you driven by any pressures to meet the need to improve the environment?</p> <p>Minister [REDACTED] Absolutely. The pressing ³² need to improve the environment was a key driving force behind the solar expansion project. Nicaragua, like many nations, faces ³³ challenges from climate change, such as extreme weather events and temperature increases. These challenges emphasize the ³⁴ urgency to ³⁵ transition to cleaner energy sources. ³⁶ Traditional energy sources contribute to environmental degradation through pollution, and the project aimed to ³⁷ mitigate these impacts. ³⁸ Our global commitments to environmental sustainability and climate action played a role in our decision. ³⁹ The environmental consequences of conventional energy sources also have direct implications for ⁴⁰ public health. Transitioning to cleaner energy aimed to ⁴¹ reduce air and water pollution, contributing to ⁴² improved public health</p>	<p>³² NEG. MOTIVE</p> <p>³³ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>³⁴ NEG. MOTIVE</p> <p>³⁵ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / POS. MOTIVE</p> <p>³⁶ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>³⁷ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>³⁸ WORKING TOWARDS POLITICAL GOALS / POS. MOTIVE</p> <p>³⁹ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>⁴⁰ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>⁴¹ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE</p> <p>⁴² ADDRESSING CLIMATE CONCERNS / POS. MOTIVE</p>

<p>outcomes. Solar energy, being resource-efficient, helps ⁴³ conserve natural resources and offers ⁴⁴ long-term environmental benefits.</p>	<p>⁴³ PROMOTING SUSTAINABILITY / POS. MOTIVE ⁴⁴ ADDRESSING CLIMATE CONCERNS / POS. MOTIVE</p>
<p>Interviewer: Let me restate, were you driven by any or all of the pressures of a need to improve the environment, politics, economics, widespread approval, or other forces we have not accounted for?</p> <p>Minister [REDACTED] The decision to pursue the solar expansion project was indeed influenced by a combination of ⁴⁵ multiple pressures and ⁴⁶ factors. The ⁴⁷ need to improve the environment was central, as was ⁴⁸ addressing climate change, ⁴⁹ environmental degradation, and ⁵⁰ public health concerns. Political considerations also played a role. The ⁵¹ strategic choice of a geographic region known for its ⁵² support of the current administration was influenced by political considerations. This aimed to ensure ⁵³ local cooperation, ⁵⁴ smooth project implementation, and to ⁵⁵ strengthen political stability by ⁵⁶ demonstrating the government's commitment to delivering tangible benefits to supportive communities. ⁵⁷ Economic advantages were significant, with the project ⁵⁸ creating job opportunities and ⁵⁹ stimulating the local economy. ⁶⁰ Widespread approval and ⁶¹ community involvement were crucial considerations. ⁶² Collaborating with international organizations ⁶³ enhanced the project's credibility, and a ⁶⁴ long-term vision for a sustainable energy future ⁶⁵ guided our decision-making.</p>	<p>⁴⁵ NEG. MOTIVE ⁴⁶ NEUTRAL MOTIVE ⁴⁷ NEG. MOTIVE ⁴⁸ ADDRESSING CLIMATE CONCERNS ⁴⁹ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE ⁵⁰ IMPACTING INDIVIDUALS ⁵¹ POS. MOTIVE ⁵² GAINING POLITICAL SUPPORT / POS. MOTIVE ⁵³ CONSTITUENCY COLLABORATION / POS. MOTIVE ⁵⁴ POLICY IMPLEMENTATION / POS. MOTIVE ⁵⁵ GAINING POLITICAL SUPPORT / POS. MOTIVE ⁵⁶ IMPACTING INDIVIDUALS / POS. MOTIVE ⁵⁷ ECONOMIC BENEFITS / POS. MOTIVE ⁵⁸ ECONOMIC BENEFITS / POS. MOTIVE ⁵⁹ ECONOMIC BENEFITS / POS. MOTIVE ⁶⁰ GAINING POLITICAL SUPPORT / POS. MOTIVE ⁶¹ CONSTITUENCY COLLABORATION / POS. MOTIVE ⁶² OTHER COLLABORATION ⁶³ POS. MOTIVE ⁶⁴ PROMOTING SUSTAINABILITY / POS. MOTIVE ⁶⁵ POLICY IMPLEMENTATION</p>
<p>Interviewer: How heavily did any of these considerations weigh on your decision to proceed with the project?</p> <p>Minister [REDACTED] Each consideration played a significant role in the decision to proceed with the solar expansion project. ⁶⁶ Environmental considerations were paramount, reflecting a ⁶⁷ commitment to global responsibilities. ⁶⁸ Political considerations were ⁶⁹</p>	<p>⁶⁶ ADDRESSING CLIMATE CONCERNS ⁶⁷ MEETING RESPONSIBILITIES ⁶⁸ GAINING POLITICAL SUPPORT ⁶⁹ POLICY IMPLEMENTATION ⁷⁰ POLICY IMPLEMENTATION ⁷¹ GAINING POLITICAL SUPPORT / CONSTITUENCY COLLABORATION ⁷² ECONOMIC BENEFITS ⁷³ ADDRESSING CLIMATE CONCERNS</p>

<p>pragmatic, ⁷⁰ ensuring stability and ⁷¹ local support. ⁷² Economic advantages were crucial for addressing ⁷³ environmental concerns and ⁷⁴ enhancing resilience. ⁷⁵ Widespread approval and ⁷⁶ community involvement were critical for success. ⁷⁷ Collaborating with international organizations enhanced credibility, and the decision ⁷⁸ aligned with a long-term vision for a ⁷⁹ sustainable energy infrastructure. ⁸⁰ decision-making process involved ⁸¹ careful weighing of environmental, political, economic, community-related, international, and long-term considerations.</p>	<p>⁷⁴ PROMOTING SUSTAINABILITY ⁷⁵ GAINING POLITICAL SUPPORT ⁷⁶ CONSTITUENCY COLLABORATION ⁷⁷ CONSTITUENCY COLLABORATION / GAINING POLITICAL SUPPORT ⁷⁸ OTHER COLLABORATION / POS. MOTIVE ⁷⁹ PROMOTING SUSTAINABILITY ⁸⁰ POLICY IMPLEMENTATION ⁸¹ POLICY IMPLEMENTATION</p>
<p>Interviewer: What factors led to the decision to pursue this project?</p> <p>Minister [REDACTED] The decision to pursue the solar expansion project was driven by a combination of strategic, environmental, economic, and political considerations. ⁸² Commitment to environmental sustainability and ⁸³ recognition of the importance of energy diversification were key. ⁸⁴ Economic development opportunities, the ⁸⁵ strategic choice of a supportive region for political stability, ⁸⁶ collaboration with international organizations, and a ⁸⁷ long-term vision for a sustainable energy infrastructure all contributed to the decision. ⁸⁸ By investing in renewable energy infrastructure, ⁸⁹ the government aimed to ⁹⁰ attract private investment, ⁹¹ boost economic growth, and ⁹² create sustainable employment opportunities</p>	<p>⁸¹ PROMOTING SUSTAINABILITY / WORKING TOWARDS POLITICAL GOALS ⁸² PROMOTING SUSTAINABILITY / WORKING TOWARDS POLITICAL GOALS ⁸³ ECONOMIC BENEFITS / POS. MOTIVE ⁸⁴ GAINING POLITICAL SUPPORT ⁸⁵ OTHER COLLABORATION ⁸⁶ WORKING TOWARDS POLITICAL GOALS ⁸⁷ WORKING TOWARDS POLITICAL GOALS ⁸⁸ PROMOTING SUSTAINABILITY ⁸⁹ POLICY IMPLEMENTATION ⁹⁰ POLICY IMPLEMENTATION / ECONOMIC BENEFITS ⁹¹ ECONOMIC BENEFITS / POS. MOTIVE ⁹² ECONOMIC BENEFITS / POS. MOTIVE</p>
<p>Interviewer: What were your feelings about this project before it began?</p> <p>Minister [REDACTED] My feelings about the solar expansion project before it began were a mix of ⁹³ optimism, determination, and a sense of responsibility. ⁹⁴ Optimism stemmed from the project's potential impact on ⁹⁵ mitigating climate change and ⁹⁶ promoting sustainable practices. There was a ⁹⁷ resolute</p>	<p>⁹³ POS. MOTIVE ⁹⁴ POS. MOTIVE ⁹⁵ ADDRESSING CLIMATE CONCERNS / NEG. MOTIVE ⁹⁶ IMPLEMENTING POLICY CHANGES / POS. MOTIVE ⁹⁷ POS. MOTIVE ⁹⁸ WORKING TOWARDS POLITICAL GOALS / POS. MOTIVE ⁹⁹ POS. MOTIVE ¹⁰⁰ POS. MOTIVE</p>

<p>determination to drive positive change in the country's energy landscape, ⁹⁸ aligning with long-term national goals. As a government official, I felt a ⁹⁹ sense of responsibility to make decisions that would have a ¹⁰⁰ lasting impact on the ¹⁰¹ nation's energy security, ¹⁰² economic development, and ¹⁰³ environmental well-being. ¹⁰⁴ Strategic considerations and an awareness of ¹⁰⁵ potential challenges were also part of the emotional landscape.</p>	<p>¹⁰¹ LEAVING A PERSONAL LEGACY / POS. MOTIVE ¹² POS. MOTIVE ¹³ POS. MOTIVE ¹⁴ POS. MOTIVE ¹⁵ NEG. MOTIVE</p>
<p>Interviewer: What obstacles did you encounter during the operation of the project?</p> <p>Minister [REDACTED] Several obstacles were encountered during the operation of the solar expansion project. ¹⁰⁶ Financial constraints, ¹⁰⁷ technological challenges, ¹⁰⁸ community resistance, ¹⁰⁹ political opposition, ¹¹⁰ regulatory hurdles, the ¹¹¹ intermittent nature of solar power, ¹¹² global economic factors, ¹¹³ susceptibility to natural disasters, and ¹¹⁴ managing public perception and awareness were among the challenges. These obstacles required ¹¹⁵ ongoing assessment and ¹¹⁶ adaptation of strategies to ensure the project's success.</p>	<p>¹⁰⁶ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹⁰⁷ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹⁰⁸ NEG. MOTIVE / COMMUNITY COLLABORATION / CHALLENGES TO OVERCOME ¹⁰⁹ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹¹⁰ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹¹¹ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹¹² NEG. MOTIVE / CHALLENGES TO OVERCOME ¹¹³ NEG. MOTIVE / CHALLENGES TO OVERCOME ¹¹⁴ NEG. MOTIVE / CHALLENGES TO OVERCOME / GAINING POLITICAL SUPPORT ¹¹⁵ POLICY IMPLEMENTATION ¹¹⁶ POLICY IMPLEMENTATION</p>
<p>Interviewer: What were the specific results of the project?</p> <p>Minister [REDACTED] The specific results of the solar expansion project were diverse. They included ¹¹⁷ increased renewable energy capacity, ¹¹⁸ job creation, economic stimulus, ¹¹⁹ diversification of the energy mix, ¹²⁰ environmental benefits, ¹²¹ community engagement and empowerment, ¹²² strengthened political support and stability, ¹²³ international collaboration and recognition, and ¹²⁴ potentially a reduction in energy costs. The specific outcomes depended on the ¹²⁵ project's scale, scope, and implementation strategies, ¹²⁶ requiring continuous monitoring and evaluation.</p>	<p>¹¹⁷ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS ¹¹⁸ ECONOMIC BENEFITS ¹¹⁹ ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS / PROMOTING SUSTAINABILITY ¹²⁰ ADDRESSING CLIMATE CONCERNS ¹²¹ CONSTITUENCY COLLABORATION / GAINING POLITICAL SUPPORT ¹²² GAINING POLITICAL SUPPORT / POLITICAL BENEFITS ¹²³ OTHER COLLABORATION / POLITICAL BENEFITS ¹²⁴ ECONOMIC BENEFITS ¹²⁵ POLICY IMPLEMENTATION ¹²⁶ POLICY IMPLEMENTATION</p>

Interviewer: What would you have done differently, given a second chance to develop another environmental project?

Minister [REDACTED] ¹²⁷ Reflecting on the solar expansion project, if given a second chance, I might ¹²⁸ enhance community engagement, ¹²⁹ stay abreast of technological advancements, ¹³⁰ implement broader public awareness campaigns, ¹³¹ focus on integrated energy storage solutions, ¹³² diversify renewable sources, ¹³³ collaborate more with private sector innovators, ¹³⁴ prioritize energy efficiency, ¹³⁵ strengthen international partnerships, and ¹³⁶ implement a robust monitoring and evaluation system.

Interviewer: Thank you, Minister Salvador Mansell [REDACTED] for sharing insights into the solar expansion project and your vision for environmental initiatives

¹²⁷ POLICY IMPLEMENTATION / EVALUATING POLICY

¹²⁸ POLICY IMPLEMENTATION / COMMUNITY COLLABORATION

¹²⁹ POLICY IMPLEMENTATION / TECHNOLOGY UTILIZATION

¹³⁰ POLICY IMPLEMENTATION / GAINING POLITICAL SUPPORT / CONSTITUENCY COLLABORATION

¹³² POLICY IMPLEMENTATION / PROMOTE SUSTAINABILITY

¹³¹ POLICY IMPLEMENTATION / PROMOTE SUSTAINABILITY / ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS

¹³³ POLICY IMPLEMENTATION / OTHER COLLABORATION

¹³⁴ POLICY IMPLEMENTATION / PROMOTE SUSTAINABILITY / ADDRESSING LONG- & SHORT-TERM ENERGY CONCERNS

¹³⁵ POLICY IMPLEMENTATION / OTHER COLLABORATION

¹³⁶ POLICY IMPLEMENTATION

The Impact of Water Scarcity in Madagascar

By



University of Texas at Austin

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Background

1.1 Background and Status of the Crisis

Madagascar, an island nation off the southeastern coast of Africa, faces a severe water scarcity crisis compounded by climate and the influence of government policies. Renowned for its exceptional ecological diversity and unique flora and fauna, Madagascar's distinctive geographic characteristics place it at the forefront of climate-related challenges. The island's rich biodiversity has earned it the title of a global biodiversity hotspot, making it not only an ecological wonder but also highly susceptible to the impacts of climate change.

Madagascar's environment poses a severe water scarcity crisis that goes beyond the usual resource challenges. Climate change, marked by rising temperatures, shifting rainfall patterns, and the increasing frequency of extreme weather events, has intensified the nation's vulnerability to water-related crises.¹ Coastal cyclones, sea-level rise, and climate-induced floods cast a shadow over the country's water security, affecting both urban and rural areas, particularly in urban centers like Antananarivo, where aging water processing and sanitation infrastructure have struggled to cope with the increasing demands.² The human cost of the water scarcity crisis in Madagascar is starkly evident. Consecutive years of failed rains have given rise to the worst drought since 1981, leading to a devastating impact on agriculture, with this year's harvest of crops such as rice, maize, cassava, and pulses expected to be less than half the five-year average, according to the World Food System.³ This has had a devastating impact on food security, with millions of people at risk of hunger. The crisis has also had a significant impact on health, which has led to an increase in waterborne diseases like diarrhea, especially among children.⁴

The Madagascan government has taken some steps to address the water scarcity crisis, such as The National Water Project (NWP).⁵ However, more must be done to ensure sustainable water access for all. Government policies ought to focus on improving water resource management, investing in water infrastructure, and educating the public on water conservation. It is also important to consider the needs of marginalized communities, who are often

¹ United Nations. "Water – at the Center of the Climate Crisis | United Nations." *United Nations*, www.un.org/en/climatechange/science/climate-issues/water.

² 'Life Brought Me Here.' Madagascar Adapts to a Changing Climate - The New York Times, <https://www.nytimes.com/2022/11/17/world/africa/madagascar-climate-change-drought-cyclone.html>

³ Southern Madagascar at risk of famine amid worst drought in 40 years. <https://www.climatechangenews.com/2021/05/13/southern-madagascar-risk-famine-amid-worst-drought-40-years/>

⁴ Bringing Safe, Clean Water and Better Sanitation to Madagascar | UNICEF USA

⁵ Madagascar: \$220 Million to Improve Basic Water and Sanitation Services and Supply

disproportionately affected by water scarcity. Therefore, this research examines the extent to which government water policies in Madagascar impact community water habits to promote a more sustainable future. It delves into the intricate web of government policies and their outcomes, with a focus on the experiences of marginalized communities. By unraveling the policy landscapes and assessing their effectiveness, this study aims to identify opportunities to improve climate preparedness, ensure sustainable water access, and mitigate the dire consequences of water scarcity in Madagascar.

1.2 Discussion of Key References and Their Limitations

In our research to explore the interconnection between water scarcity, community habits, and government policies in Madagascar, we examined three key references provided to us: McArthur, Amar Bhattacharya, Homi Kharas, Mertz, et al., and Al-Zu'bi. These references, while informative in their own right, collectively shed light on certain limitations that are pertinent to our research focus on the impact of government policies on water resource management and clean water access in Madagascar.

Each of these references offers valuable insights into the challenges developing nations face and their vulnerability in the context of climate change. McArthur, Amar Bhattacharya, and Homi Kharas emphasize the vulnerabilities of emerging markets and developing economies (EMDEs) and their need for support from advanced economies.⁶ Mertz et al. stress the importance of adaptation strategies in developing countries.⁷ Al-Zu'bi's work highlights the need for intersectoral approaches in climate change governance.⁸ However, when considering our specific case study in Madagascar, these references collectively fall short in addressing the intricate relationship between government policies, water resource management, and clean water access. None of the references directly address the impact of government policies on these critical aspects in Madagascar. Their discussions, while relevant in a broader context, do not delve into the local dynamics and concrete policy actions taken by the Madagascan government to mitigate climate-induced water scarcity and improve access to clean water.

⁶ Why developing country voices will shape the global climate agenda | Brookings, <https://www.brookings.edu/research/why-developing-country-voices-will-shape-the-global-climate-agenda/>

⁷ Adaptation to Climate Change in Developing Countries | SpringerLink, <https://doi.org/10.1007/s00267-008-9259-3>

⁸ Jordan's climate change governance framework: from silos to an intersectoral approach | SpringerLink, <https://doi.org/10.1007/s10669-016-9602-9>

These limitations underscore the significance of our research, which aims to provide a focused examination of Madagascar's unique challenges concerning water scarcity, community action, and government policies. We will explore a specific government policy in Madagascar and its effects on community water consumption habits, water resource management, clean water access, and their broader implications for climate adaptation. By doing so, we aspire to bridge the existing gap in the literature and contribute to a more comprehensive understanding of the multifaceted water and climate challenges faced by Madagascar.

Literature Review

Our literature review addresses and analyzes the hazardous results of climate change on the island of Madagascar. Madagascar's position as an island in the southern part of the Indian Ocean off the coast of Africa offers a unique set of circumstances and conditions that make Madagascar vulnerable to climate change. This is compounded by the fact that Madagascar has an environment “favorable to the development of fauna and flora that are most unique in the world.”⁹ This situation means Madagascar is at a higher risk for climate change-related consequences and disasters than most countries worldwide.

The first article we analyzed, Nematchoua, et al. 2018, seeks to address and measure the impact of various climate-related phenomena across multiple regions and situations within Madagascar, providing empirical data to show the “instability and vulnerability of Madagascar in the face of climate change” and how the conditions have worsened for the environment, the population, and the region.¹⁰ This provides much of the empirical data we can utilize to demonstrate the effects of climate change, including the effects on water sustainability within Madagascar and how it can vary across multiple regions on the island. However, for the purpose of our study, it fails to provide sufficient policy examples of how Madagascar has attempted to mitigate these effects, allowing us more room to explore alternative research for policy documentation.

⁹ Modeste Kameni Nematchoua et al., “A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island,” *Sustainable Cities and Society* 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

¹⁰ Modeste Kameni Nematchoua et al., “A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island,” *Sustainable Cities and Society* 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

The second article, Bastaraud, et al. 2020, provided an in-depth study of the deterioration in water quality in the capital city of Madagascar, Antananarivo. The article addresses “between rainfall patterns and microbial water quality,” especially within a relatively poorly developed city such as Antananarivo.¹¹ This literature is key in providing an empirical observation of how the quality of water, impacted by climate (through rainfall) can have consequences for the country's population. This can better give us information on how to quantify the change in water through various mediums. However, it does not describe any policies the Madagascar government, or the city government, have taken to mitigate or solve this issue. It also fails to address what potential actions or input the community of Antananarivo has expressed or how they have been impacted by changes in water quality. This will also give us room to explore potentially more refined and focused policy documentation implemented to mitigate these climate-related issues.

Overall, while our literature provided the key data we can use to move forward for empirical analysis, these cases fail to address which policies the Madagascar government has used or any survey data from the local populace of Madagascar and how changes in water quality have impacted them. This highlights the gap in our research which we will need to address going forward to answer our research question. Given these understandings of our references and what they failed to address, this led us to our final research question: *How do community voices and government policies impact water scarcity in Madagascar?* By exploring this question and topic, we aim to provide valuable insights and recommendations for furthering progress in mitigating Madagascar's water crisis.

Conceptual Framework

After reviewing the existing research surrounding the influence of water scarcity on Madagascar's climate preparedness, as well as the gaps within that research, we propose our research can expand the knowledge of the subject using the following conceptual framework, displayed in *Figure 1.1*. We will be using this framework to investigate our proposed hypothesis: *Government water policies and community water habits decrease the level of water scarcity in Madagascar.*

¹¹ Bastaraud, Alexandra, et al. "The impact of rainfall on drinking water quality in Antananarivo, Madagascar." PLoS one 15.6 (2020): e0218698.

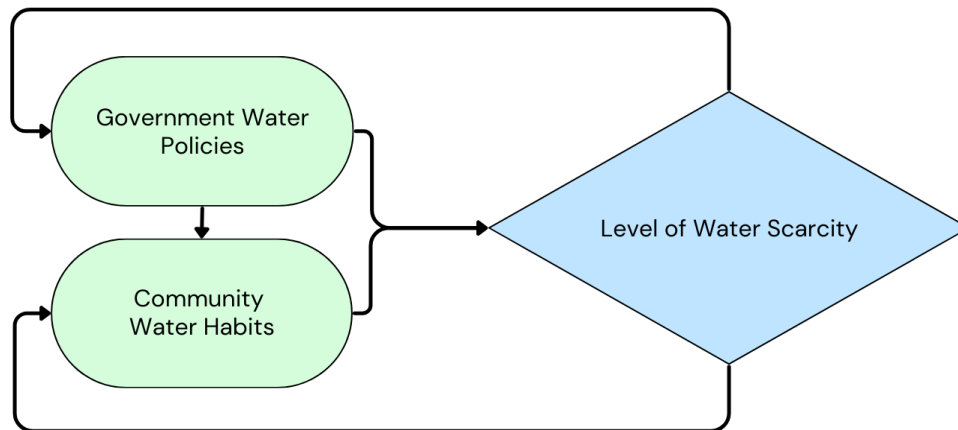


Figure 1.1: Causal pathway between Government Water Policies, Community Water Habits, and their influence on Water Scarcity.

This theoretical framework was derived from the Nematchou, et al. 2018 and Bastaraud, et al. 2020 studies included in the literature review, where results indicated a cyclical relationship between the implementation of government water policies and the level of water scarcity.¹² This study will focus on expanding that theoretical understanding to include the influence of community water consumption habits throughout Madagascar, both how they are affected by government water policies and how they influence nationwide levels of water scarcity. This piece of the causal pathway has not been specifically defined in the existing literature, but further study on it has been broadly recommended by the academic field surrounding this issue. To define the correlations between how government policies determine community water habits, a section of our data collection surveys will ask respondents to identify their awareness of government water restrictions/conservation policies and describe how these policies have influenced their water consumption within the last two years. To define the correlations between community water consumption and overall levels of water scarcity, a section of our data collection surveys will ask respondents to describe their perceived difficulty in accessing safe drinking water, and also

¹² Bastaraud, Alexandra, et al. "The impact of rainfall on drinking water quality in Antananarivo, Madagascar." *PloS one* 15.6 (2020): e0218698.

Modeste Kameni Nematchoua et al., "A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island," *Sustainable Cities and Society* 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

compare this difficulty to what they experienced two years prior. Following this model will allow us to hone in on the role that community habits play within the larger cycle of water policies and water scarcity.

The nation of Madagascar already faces significant climate vulnerabilities as a result of its location, geographical characteristics, and poor climate infrastructure.¹³ Madagascar's unique position as a large island off the Southeastern coast of Africa makes it highly vulnerable to coastal cyclones, sea level rise, and climate-related floods (*Figure 1.2*).¹⁴ Each of these environmental challenges contributes to rising water insecurity in Antananarivo and the surrounding towns with water processing and sanitation capabilities. While various government policies have been implemented by the government of Madagascar in response to these risk factors, our study will use one of these policies as a central case study.

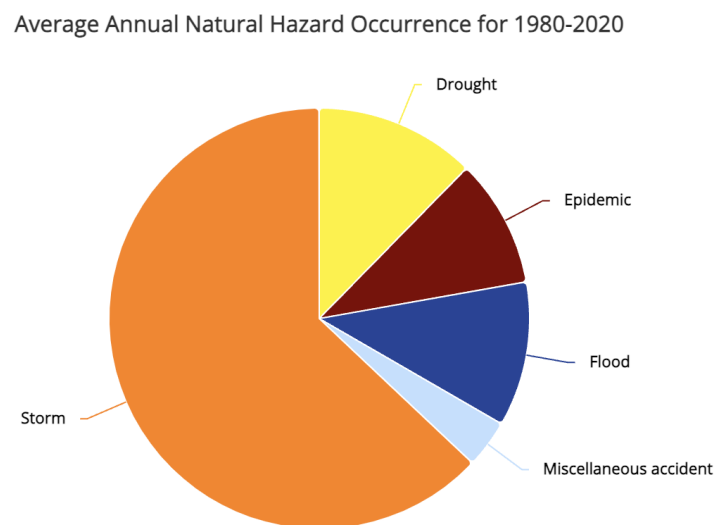


Figure 1.2: *Percentage of Annual Hazard Occurrence in Madagascar, 1980 - 2020.*

Within our theoretical framework, we will use Madagascar's National Water Project.¹⁵ as a case study for a nationwide government policy focused on water infrastructure and conservation. The NWP is a nationwide \$220 million initiative aimed at improving water

¹³ World Bank Group, "Madagascar: \$220 Million to Improve Basic Water and Sanitation Services and Supply," World Bank, June 20, 2022.

¹⁴ "World Bank Climate Change Knowledge Portal," n.d.

¹⁵ "The Madagascar Water Project Inc - Clean Water, Poverty," The Madagascar Water Project, June 3, 2022.

security in Antananarivo and other cities across Madagascar, with a secondary focus on climate resiliency and emergency response.¹⁶ As part of the project, the NWP aims to repair over 700 water wells across Madagascar that are currently in various states of disrepair.¹⁷ Our aim with this portion of the framework is to measure how water scarcity has changed in Madagascar since the implementation of the NWP, as well as the influence the NWP has had on individual water consumption habits. Existing studies have failed to demonstrate the causal connections between the implementation of the NWP and its effect on water consumption at the community level. In our analysis, we intend to use the NWP as an example of a water policy that is representative of other Madagascan government policies regarding water security.

IRB and Ethical Considerations

Our research on water scarcity, community habits, and government policies in Madagascar demands a nuanced understanding of the ethical landscape. As we explore the intricate fabric of this unique environment, we must consider the multifaceted challenges associated with achieving informed and voluntary consent. Drawing insights from the "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research" paper by Elysée Nouvet and colleagues, published in the Canadian Journal of Bioethics, we can shed light on some key considerations.¹⁸

The linguistic landscape of Madagascar presents a challenge. Being a primarily Francophone country, with Malagasy as the official language, the role of translators becomes pivotal, especially as English might not be widely comprehended, more so in rural pockets. The process of 'back-translation' will be employed, starting with English questions, which will then be translated into Malagasy or French.¹⁹ To ensure the sanctity of meaning, a second translator will translate these back into English. A team of 3-4 translators will be essential to ensure the consistency and accuracy of this procedure.²⁰

¹⁶ "The Madagascar Water Project Inc - Clean Water, Poverty," The Madagascar Water Project, June 3, 2022.

¹⁷ The Madagascar Water Project, June 3, 2022.

¹⁸ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." Canadian Journal of Bioethics 5.1 (2022): 36.

¹⁹ Bullen, Pirooska Bisits. "How to Write Awesome Survey Questions - Part 1." Tools4dev, 26 Jan. 2022, tools4dev.org/resources/how-to-write-awesome-survey-questions-part-1/.

²⁰ Marshall, Catherine, et al. "Managing, Analyzing, and Interpreting Data." Designing Qualitative Research, Sage, Thousand Oaks, CA, 2014, p. 210.

However, it's important to recognize, in line with Nouvet et al.'s observations, that certain technical terms lack precise equivalents in local languages. This linguistic challenge may introduce complexity to interviews, as participants may struggle to fully grasp these technical concepts.²¹ To mitigate this limitation, researchers, as emphasized by Nouvet and her colleagues, must proactively ensure that technical terms are explained clearly and with cultural sensitivity during interviews. This may involve simplifying language or providing practical examples to enhance participants' understanding while preserving research data accuracy.

Navigating language barriers and translation complexities is only one facet of the challenges we encounter in our research. Cultural nuances, especially those tied to gender dynamics, add another layer of complexity. In some communities, there may be reservations about researchers of one gender interviewing participants of the opposite gender. To address this, we prioritize understanding local customs and gender dynamics, employing both male and female translators and field assistants. This approach ensures our research activities align with cultural norms and preferences while maintaining ethical standards.

Another unique challenge arises from the influence of traditional leaders, known as "Les Chefs," in Malagasy communities.²² Obtaining individual consent may involve seeking approval from these leaders, whose influence on participants' decisions is unclear. Respecting the role of these leaders and following proper procedures for gaining permission is crucial for our researchers in the study. Cultural norms of politeness in some Malagasy communities may also impact participants' willingness to decline participation.²³ Participants might hesitate to refuse invitations, fearing it could be perceived as impolite. Clear and transparent communication is essential to convey participants' right to decline without social repercussions, emphasizing the voluntary nature of their decision. Moreover, our study acknowledges the widespread apprehension in Antananarivo, particularly regarding signing or consenting to foreign documents.²⁴ Historical distrust rooted in colonial government missions contributes to this skepticism. To build trust, we plan to conduct community outreach and educational activities,

²¹ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

²² Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 38.

²³ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

²⁴ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

prioritizing transparency, collaboration with local partners, and cultural sensitivity. Establishing feedback mechanisms and involving community members are integral parts of our strategy to overcome historical mistrust and ensure ethical conduct in our study, respecting the unique cultural and historical context of Antananarivo communities.

Madagascar's infrastructure challenges, as highlighted by World Bank data, present formidable obstacles to our research endeavors. The inadequacy of basic infrastructure, including electricity and digital resources, is stark, with only 33.7% of the population having access to electricity in 2023, significantly below the regional average of 48.4% recorded in 2020.²⁵ This infrastructure shortfall has dire consequences, leaving over 18 million individuals without electricity access, ranking Madagascar 13th globally in unelectrified populations.²⁶ The challenges extend to the realm of digital connectivity and broadband services, where Madagascar lags despite some limited progress. Internet usage has seen a gradual increase, reaching approximately 22% of the population in 2021, compared to a mere 5.1% in 2016. However, this penetration rate remains one of the lowest globally, notably falling short of the 33% regional average observed in Sub-Saharan Africa.²⁷ These infrastructure limitations significantly impact our research, particularly concerning data storage, member communication, and online research activities. The scarcity of electricity and limited internet access pose challenges in effectively engaging with diverse communities in Madagascar. In response, we commit to employing alternative communication methods and launching proactive awareness campaigns to bridge the information gap, ensuring that our research reaches and benefits as many people as possible in Madagascar.

Ensuring the highest ethical standards in our research involving human subjects necessitates obtaining approvals from the Institutional Review Board (IRB). The IRB serves a critical role in upholding ethical guidelines and safeguarding the rights, well-being, and privacy of research participants. It reviews and monitors research proposals to ensure adherence to established ethical standards. In the context of Madagascar, it is crucial to acknowledge the potential existence of indigenous review mechanisms tailored to local contexts and cultural

²⁵ "Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April.

²⁶ Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April.

²⁷ Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April

norms. Researchers must respect and adhere to these mechanisms when present, providing additional layers of ethical oversight specific to the local community. Our commitment to ethical research involves both IRB approvals and compliance with indigenous review mechanisms. This dual approach emphasizes our dedication to conducting research in a manner that respects local values, traditions, and ethical principles. By incorporating these two layers of ethical oversight, we aim to maintain the highest standards while addressing unique ethical considerations within the research context.

Our comprehensive study on water scarcity, community habits, and government policies in Madagascar acknowledges the intricate ethical landscape shaped by linguistic, cultural, and infrastructure challenges. Drawing insights from Elysée Nouveta and colleagues' research, we recognize the importance of addressing these complexities. Our approach includes meticulous translation, clear explanation of technical terms, and a diverse team to ensure meaningful and culturally sensitive consent.

Gender dynamics and the influence of traditional leaders require respect and understanding in our research. Historical mistrust surrounding document signing is addressed through community outreach and transparency. Additionally, data from the World Bank underscores significant disparities in infrastructure, with over 18 million people lacking electricity access and limited internet penetration. Despite these challenges, our research endeavors to navigate this terrain while upholding the highest ethical standards and respecting the unique context of Madagascar's communities.

Research Design

With NWP being the case study for this project, this will entail a mixed-methods approach, which includes interviews and document analysis.²⁸ Qualitative data will be collected from in-person interviews and analyzed alongside existing quantitative data on Madagascar's level of water scarcity for contextual purposes, which would be in line with an "exploratory sequential research design" as described by Creswell and Clark.²⁹ The kinds of insights we hope to draw from the interviews in particular lie within the tentative coding scheme below. Coding in

²⁸ Marshall, Catherine, et al. "The How of the Study: Building the Research Design." *Designing Qualitative Research*, Sage, Thousand Oaks, CA, 2014, p. 103.

²⁹ Creswell, John W., and Vicki L. Plano Clark. "Collecting Data in Mixed Methods Research." *Designing and Conducting Mixed Methods Research*, CORWIN Press INC, 2017, p. 185.

general will be necessary for this project to conduct a fruitful relational content analysis of the interview results. This will allow us to draw patterns between the water quality and availability in Southern versus Northern towns, for example, while taking into account the weather patterns. Furthermore, all responses to the interview questions are able to be coded. The anticipated themes are based on the contents of the literature review. These will then be further expanded upon through “in vivo” coding in the later stages of the data collection process as sub-themes, or sub-clusters, emerge from the in-person interviews.³⁰

Data Collection

In terms of sample selection criteria, NWP seeks to increase clean water access in the cities and towns of Antananarivo, Antsiranana, Mahajanga, Antsirabe, Fianarantsoa, and Manakara, so stratified sampling will be utilized to interview a sample of residents from each of these cities.³¹ Conveniently, the geographic position of the preceding cities will provide a diversity of answers, since the cities are spread all across Madagascar. For example, according to the United States Agency for International Development (USAID), Southern Madagascar is said to be more drought-prone, while Eastern Madagascar experiences higher rates of precipitation.³² So, answers from Fianarantsoa (South) compared to Antsiranana (North) will allow the research team to control for the differences in climate-induced weather events experienced by different parts of the island to be able to focus on the specific influence of government policies and initiatives, such as the National Water Project. Therefore, the expected outcome of the interview results is that the individuals sampled within each city will yield consistent findings due to the distinctive climate and weather patterns prevalent in their respective regions.

As for the interview itself, it will be a semi-structured, in-depth interview with a combination of open- and closed-ended questions asked in person.³³ The interviews will be one-on-one between an interviewer and the interviewee to eliminate the risk of answers being swayed by the presence of other people. The sample itself will ideally mimic the age, income, and gender demographics of the Madagascan population. The interviews will need to be digitally

³⁰ Marshall, Catherine, et al. 2014, p. 218.

³¹ World Bank, June 20, 2022.

Creswell, John W., and Vicki L. Plano Clark, 2017, p. 177.

³² Madagascar Water Resources Profile Overview, United States Agency for International Development, winrock.org/wp-content/uploads/2021/08/Madagascar_Country_Profile-Final.pdf.

³³ Creswell, John W., and Vicki L. Plano Clark, 2017, p. 179.

recorded to back-translate the responses to English for the analysis phase.³⁴ Before the interviews, a survey needs to be disseminated to take note of any special accommodations, but most importantly, to note the native language of the interviewee, since both Malagasy and French are the official languages of Madagascar.³⁵ We will have interviewers who can speak either Malagasy, French, or both, so the research team is not limited to a certain sample of people within each city.

Another step to take place before conducting the interviews would be to create a focus group of select people from the sample to participate in a community mapping session. According to Preston City Council, community mapping is a participatory evaluation technique “...involving residents in identifying the assets of their neighborhood, looking at opportunities and creating a picture of what it is like to live there.”³⁶ In this project, a community map would give the research team an idea of the proximities between the interviewees and La Jirosoy Rano Malagasy (JIRAMA) locations and the kinds of weather events that may affect where they get their water. JIRAMA is a state-run water company that distributes and manages water services in all regions of Madagascar.³⁷ It is also the same company that is being financially supported by the World Bank through the NWP.³⁸ Conducting a focus group to create a community map would essentially allow the research team to view a unique map of nearby water sources known by locals who live in each of the cities, and this map could also be utilized in the analysis phase to visualize the concentration of interviewees within each city. The outcome of the focus group may also lead the research team to refine interview questions if needed and solidify themes in the coding scheme, almost like the purpose of a “pilot study.”³⁹

Proposed Interview Questions *(to be asked in both preliminary focus groups and individual interviews)*

Background Questions:

1. What is your name?

³⁴ Creswell, John W., and Vicki L. Plano Clark, 2017, p. 180.

³⁵ Madagascar: The Impact of Language Policy and Practice on Children’s Learning: Evidence from Eastern and Southern Africa 2017, UNICEF, 2017, www.unicef.org/esa/sites/unicef.org/esa/files/2018-09/UNICEF-2016-Language-and-Learning-FullReport.pdf.

³⁶ The Community Mapping Toolkit, Preston City Council, ucanr.edu/sites/CA4-HA/files/206668.pdf.

³⁷ “JIRAMA.” Association of Power Utilities of Africa, APUA, apua-asea.org/en/page-de-profil-utilisateur/jirama-/profil/.

³⁸ World Bank, June 20, 2022.

³⁹ Marshall, Catherine, et al. 2014, p. 105.

2. What is your age?
3. What is the highest education level you have attained?
4. What is your employment status?
5. What is your income (MGA biweekly)?
6. What neighborhood/city do you live in?
7. How many people live in your household, and what is their relationship to you?

Water Usage and Access Questions:

1. What do you use water for on a daily basis?
2. Who or what is your primary source of water?
3. Do you track your water usage?
4. Can you estimate the amount of water you use on a daily basis?
5. Please describe how easy or difficult it is to acquire sufficient water for you and your household's daily needs *currently*.
6. Please describe how easy or difficult it was to acquire water that was sufficient for you and your household's daily needs *2 years ago*.
7. To what extent do climate/weather conditions impact your neighborhood's water access and quality?

Policy Perception and Awareness Questions:

1. Are you aware of any government water restrictions/policies?
2. Are you aware of the National Water Project?
 - a. *If yes to the previous question*, what do you know about the National Water Project?
3. To what extent government water restrictions/policies have influenced your water consumption within the last two years?
4. How has the National Water Project (initiatives) contributed to your water quality and access in your community?

Other Questions:

1. Is there anything else you want to share about your water usage, access, or relevant policies?

Coding Scheme

Code Type	Questions	Clusters/Themes	Sub-Clusters
Identifying Information Codes	What is your name?	Name	N/A
	How old are you?	Age	18-24 years
			25-34
			35-44
			45-54
			55-64
			65+
	What is the highest education level you have attained?	Education	Primary Education
			Secondary Education
			Associate's Degree
			Bachelor's Degree
			Professional Degree
	What is your current employment status?	Employment	Full-Time Employment
			Part-Time Employment
			Intermittent Employment
			Retired
	What is your income (MGA biweekly)?	Biweekly Income (MGA in thousands)	<175
			>175 - 275
			>275 - 375
			>375 - 475

			>475
	In which region/city do you live?	Northern Region	Antsiranana
		Eastern Region	Fianarantsoa
		Central Region	Antsirabe, Antananarivo
		Western Region	Mahajanga
		Southern Region	Manakara
	How many people live in your household?	Household Size	Single person
			Two person
			Over Three people
In Vivo Codes	What do you use water for on a daily basis?	Personal (within household)	Consumption: Drinking, Cooking
			Cleaning, Bathing
		Commercial	Consumption: Food and drink
			Sanitation
		Mix of personal and commercial	Both personal and commercial consumption
	What is your primary water source?	Self or Community Collected	Groundwater
			River water
			Rainwater
		Government Provided	Municipal Fountain
			Tapwater (house)
			Other
	Have you tracked your water usage within the last two years?	Yes	Tracked for 6 months - 1 year
			Tracked for over 1 year

		No	Has not tracked
	Can you estimate the amount of water you use on a daily basis?	Low	0 - 49 liters/day
			50 - 149 liters/day
		High	150 - 249 liters/day
			Over 250 liters/day
Magnitude Codes	Is your current usage amount more, less, or about the same as it was two years ago?	More	Substantially more
			Slightly more
		About the same	No change
		Less	Slightly less
			Substantially less
	Please describe how easy or difficult it was to acquire sufficient water for you and your household's daily needs <i>two years ago</i> .	Easy	Substantially easier
			Slightly easier
		Neutral	No change
		Difficult	Slightly more difficult
			Substantially more difficult
	Please describe how easy or difficult it is to acquire sufficient water for you and your household's daily needs <i>currently</i> .	Easy	Substantially easier
			Slightly easier
		Neutral	No change
		Difficult	Slightly more difficult
			Substantially more difficult
	To what extent do climate/weather conditions impact your neighborhood's water access and quality?	Influential	Substantially influential
			Slightly influential
		Not influential	Not influential
	Are you aware of any	Yes	Very aware

	government water restrictions/policies?		Somewhat aware
		No	Not aware
	Are you aware of the National Water Project?	Yes	Very aware
			Somewhat aware
	To what extent have government water restrictions/policies influenced your water consumption <i>within the last two years?</i>	Influential	Substantially influential
			Slightly influential
		Not influential	Not influential
	How has the National Water Project (initiatives) contributed to water access in your community?	Positive contribution	Substantially increased access
			Slightly increased access
		No contribution	No change in access
		Negative contribution	Slightly decreased access
			Substantially decreased access
Direct Quotation	What do you know about the National Water Project?	N/A	N/A
	Is there anything else you want to share about your water usage, access, or relevant policies?		

Findings

The following transcript uses interview questions that were finalized based on the outcome of the focus group consisting of a sample of twelve people who live in NWP-participating cities (two people from each city). Following the focus group, the research team wanted to emphasize the differences in climate/weather experiences in the interview results by adding the question, “To what extent do climate/weather conditions impact your

neighborhood's water access and quality?" Additionally, questions regarding water quality were removed after discovering the need to hone in on water accessibility as a single variable.

Mock Interview Transcript

Good afternoon. Thank you for taking the time to share your experiences of water access in Madagascar. My name is [] and assisting me is []. We are both with the University of Texas at Austin.

You were asked to participate in this study because of your residence within an area of Madagascar targeted by government water usage policies within the last two years. We are interested in gaining your perspective on governmental efforts to preserve water in your area, as well as hearing your thoughts on how these policies have influenced both you and your community's water consumption habits. You were previously notified of the conditions of this interview and have consented to participate in this survey. Please answer the interview questions to the best of your ability. If you do not have any questions, we will proceed.

1. Interviewer: What is your name?

Subject: I'm [REDACTED]

[IDENTIFYING INFORMATION CODE – NAME]

2. Interviewer: How old are you?

Subject: I am 34 years old.

[IDENTIFYING INFORMATION CODE – AGE, 25-34]

3. Interviewer: What is the highest education level you have attained?

Subject: I have a high school diploma.

[IDENTIFYING INFORMATION CODE – EDUCATION, Secondary Education]

4. Interviewer: What is your current employment status?

Subject: I work as a construction laborer.

[IDENTIFYING INFORMATION CODE – EMPLOYMENT, Full-Time Employment]

5. Interviewer: What is your income (MGA biweekly)?

Subject: My biweekly income is around 300,000 MGA.

[IDENTIFYING INFORMATION CODE – INCOME, >275 - 375]

6. Interviewer: In which neighborhood/city do you live?

Subject: I reside in the Andoharanofotsy neighborhood in Antananarivo.

[IDENTIFYING INFORMATION CODE – CENTRAL REGION, Antananarivo]

7. Interviewer: How many people live in your household?

Subject: There are four people in my household - myself, my wife Sarah, and our two children, Lily and Michael.

[IDENTIFYING INFORMATION CODE – HOUSEHOLD SIZE, Over Three people]

Interviewer: Now, moving on to water usage and access:

8. Interviewer: What do you use water for on a daily basis?

Subject: We use water for drinking, cooking, bathing, and household cleaning on a daily basis.

[IN VIVO CODE – PERSONAL, Drinking, Cooking, Bathing, Cleaning]

9. Interviewer: What is your primary source of water?

Subject: Our primary source of water used to be groundwater from a well, but recently we've shifted to the municipal water supply.

[IN VIVO CODE – GOVERNMENT PROVIDED, Municipal Fountain]

10. Interviewer: Have you tracked your water usage within the last two years?

Subject: No, we don't track our water usage.

[IN VIVO CODE – NO, Has not tracked]

11. Interviewer: Can you estimate the amount of water you use on a daily basis?

Subject: The amount of water we use in a day is dependent on how much water we are able to acquire from the municipal fountain. Sometimes we can also use rainwater if we can collect any. Our usage is likely around 30-50 liters a day.

[IN VIVO CODE - LOW, 0 - 49 liters/day]

12. Interviewer: Please describe how easy or difficult it was to acquire sufficient water for you and your household's daily needs *two years ago*.

Subject: Two years ago, we were solely dependent on groundwater, and our usage was lower. The change to the municipal supply increased our daily water intake. Acquiring water two years ago was a bit challenging, especially during the dry season. The well would sometimes run dry.

[MAGNITUDE CODE – DIFFICULT, Slightly more difficult]

13. Interviewer: Please describe how easy or difficult it is to acquire sufficient water for you and your household's daily needs *currently*.

Subject: Acquiring sufficient water has become much easier since we switched to the municipal supply. It's more reliable compared to relying on groundwater.

[MAGNITUDE CODE – EASY, Substantially easier]

14. Interviewer: To what extent do climate/weather conditions impact your neighborhood's water access and quality?

Subject: Climate conditions, especially during the dry season, significantly impacted groundwater access. With the municipal supply, these impacts are less severe.

[MAGNITUDE CODE – INFLUENTIAL, Substantially influential]

Interviewer: Now, shifting to policy perception and awareness.

15. Interviewer: Are you aware of any government water restrictions/policies?

Subject: I've heard about some water restrictions, but I'm not fully aware of the details.

[MAGNITUDE CODE – YES, Somewhat aware]

16. Interviewer: Are you aware of the National Water Project?

Subject: Yes, I've heard about the National Water Project.

[MAGNITUDE CODE – YES, Very aware]

17. Interviewer: What do you know about the National Water Project?

Subject: I know it's a government initiative focusing on improving water infrastructure across the country.

[IN VIVO CODE – DIRECT QUOTATION]

18. Interviewer: To what extent have government water restrictions/policies influenced your water consumption within the last two years?

Subject: They've influenced us significantly, as our shift to the municipal fountain water supply was only possible due to the National Water Project increasing the availability of water through that source. The government has also generally advised our community on the necessity of water conservation.

[MAGNITUDE CODE – INFLUENTIAL, Substantially influential]

19. Interviewer: How has the National Water Project (initiatives) contributed to your water quality and access in your community?

Subject: While I don't have detailed information, I believe initiatives like the National Water Project could positively impact water quality and access in communities like ours.

[MAGNITUDE CODE – LARGE CONTRIBUTION, Substantially increased access]

20. Interviewer: Is there anything else you want to share about your water usage, access, or relevant policies?

Subject: I'm grateful for the improved water quality and accessibility since switching to the municipal supply. It has made a significant difference in our daily lives, and I hope such improvements continue for everyone in our community.

[IN VIVO CODE – DIRECT QUOTATION]

**Mock interview answers generated using ChatGPT*

Data Analysis

Through the use of inductive, in vivo coding, the preceding coding scheme will assist in the data analysis process by providing a summarization of the interview responses. As noted previously, a focus group was conducted prior to the interviews. The focus group fulfilled multiple purposes, such as piloting the first draft of interview questions, editing questions where necessary, refining clusters, and identifying sub-clusters. Therefore, the focus group results will not be analyzed as part of the overall interview results. As for the mock response generated by ChatGPT, the above responses verified that the ranges in the sub-cluster column of the coding scheme were appropriate. The final coding scheme closely adheres to J. Saldaña's codes-to-theory model for qualitative inquiry in *The Coding Manual for Qualitative Researchers*.⁴⁰ Saldaña's model is hierarchical in that codes are generated from theory, to concepts, to categories, and then to sub-categories. Furthermore, the specific strategies utilized for coding were a combination of in vivo coding and magnitude coding. Coding for more unique responses, such as identifying information, was coded differently based on existing knowledge of the sample to be interviewed and standard categories (ranges) for such information. In terms of adjustments to the coding scheme, magnitude coding was an additional strategy implemented after receiving the mock interview results in order to effectively categorize responses that specified a direction, intensity, or frequency, in the form of words or numbers.⁴¹

Discussion

The interview with [REDACTED] not only serves as a validation of expected results but also provides a glimpse into the broader consensus within the community, lending significant weight to our research thesis. John's responses are indicative of a larger trend within the community, where the transition from groundwater to municipal water supply aligns with a shared experience influenced by government policies, particularly the NWP. This interview reflects a consensus among community members, suggesting a widespread adoption of the new water management practices promoted by government initiatives.

⁴⁰ Saldaña, J. *The Coding Manual for Qualitative Researchers*. Los Angeles, CA: Sage Publications, 2009, pg. 12.

⁴¹ Saldaña, J. 2009, pg. 58.

The revelation that municipal water serves essential daily needs underscores the interconnectedness between individuals and their water requirements. The community-wide shift from groundwater to the municipal water supply, symbolized by the Municipal Fountain, suggests a collective adaptation influenced by government policies. Despite not actively tracking water usage, John's estimate indicates a certain level of awareness among community members regarding their consumption patterns. Two years prior, when facing challenges linked to dependence on groundwater, John's answers corresponded with the research thesis highlighting the necessity for enhanced water access. The present ease of water acquisition since adopting the municipal supply highlights the potential positive impact of government initiatives, not just on an individual level but potentially resonating throughout the community. John's acknowledgment of government policies, coupled with awareness of NWP, signals community engagement with water-related regulations and infrastructure initiatives. The substantial influence of government policies on water consumption, exemplified by the community-wide shift to municipal supply attributed to NWP, strongly aligns with the research thesis. Moreover, the optimistic outlook that initiatives like NWP could positively impact water access reflects the potential household-level benefits of government-led interventions.

The insights derived from this interview align closely with our hypothesis, asserting that governmental water policies in Madagascar play a pivotal role in shaping community water practices with the overarching goal of fostering sustainability. The interview validates this by showcasing how NWP has not only influenced individual practices but has also contributed to a collective decrease in water scarcity at the community level in Madagascar. The acknowledgment of government water restrictions, emphasis on conservation, and the positive reception of improved water access resonate with the overarching goal of fostering sustainability as outlined in our proposed research question.

Reflection and Conclusion

For conducting our qualitative project, we established a proposal that we deemed possible and approachable given the constraints of our environment. Some aspects of our research were easier to conceptualize and obtain versus others, given the scope and specificity of our research question. Throughout our research we learned how to establish a qualitative study, the

methodology for conducting an effective interview process, and how to effectively analyze these results within the context of our research question.

The interview's focus on how government policies affected water usage of communities in Madagascar was likely too narrow in terms of surveying across different municipalities and even income levels of Madagascar. If we were to repeat this survey or model it for future potential surveys, we would recommend that the questions include a consideration for the income levels of those interviewed, as well as their proximity to municipal water access points. As with most survey data, it will always be optimal to poll a group as expansively as possible to obtain more results and therefore identify broader patterns within water usage and scarcity. Overall, despite these obstacles, the data we collected was able to substantiate our expected outcome for the study, considering the mock interview demonstrated a direct causal link between Madagascan water policy and individual/community water consumption.

This research has examined the extent to which government water policies impact community water habits in Madagascar. Our conceptual framework aimed to contribute to a deeper understanding of how government interventions, community behaviors, and overall water scarcity were connected. Our research design considered the ethical challenges of conducting research in Madagascar, such as language barriers, cultural sensitivities, and infrastructure limitations. We used a mixed-methods approach of interviews and document analysis to gather data. We interviewed residents in key cities across Madagascar, focusing on those targeted by our central case study, the NWP.

The findings suggest that government water policies have a significant impact on community water habits and that these habits in turn affect water scarcity. The research also found that there are regional variations in water scarcity, with southern Madagascar being more drought-prone than eastern Madagascar. We recommend that more research must be done that considers water quality in Madagascar and how water quality affects the communities' use of municipal water.

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Team: [REDACTED]

Water Scarcity in Madagascar

Background

1.1 Background and Status of the Crisis

Madagascar, an island nation off the southeastern coast of Africa, faces a severe water scarcity crisis compounded by climate and the influence of government policies. Renowned for its exceptional ecological diversity and unique flora and fauna, Madagascar's distinctive geographic characteristics place it at the forefront of climate-related challenges. The island's rich biodiversity has earned it the title of a global biodiversity hotspot, making it not only an ecological wonder but also highly susceptible to the impacts of climate change.

Madagascar's environment poses a severe water scarcity crisis that goes beyond the usual resource challenges. Climate change, marked by rising temperatures, shifting rainfall patterns, and the increasing frequency of extreme weather events, has intensified the nation's vulnerability to water-related crises.¹ Coastal cyclones, sea-level rise, and climate-induced floods cast a shadow over the country's water security, affecting both urban and rural areas, particularly in urban centers like Antananarivo, where aging water processing and sanitation infrastructure have struggled to cope with the increasing demands.² The human cost of the water scarcity crisis in Madagascar is starkly evident. Consecutive years of failed rains have given rise to the worst drought since 1981, leading to a devastating impact on agriculture, with this year's harvest of crops such as rice, maize, cassava, and pulses expected to be less than half the five-year average, according to the World Food System.³ This has had a devastating impact on food security, with millions of people at risk of hunger. The crisis has also had a significant impact on health, which has led to an increase in waterborne diseases like diarrhea, especially among children.⁴

¹ United Nations. "Water – at the Center of the Climate Crisis | United Nations." *United Nations*, www.un.org/en/climatechange/science/climate-issues/water.

² 'Life Brought Me Here.' Madagascar Adapts to a Changing Climate - The New York Times, <https://www.nytimes.com/2022/11/17/world/africa/madagascar-climate-change-drought-cyclone.html>

³ Southern Madagascar at risk of famine amid worst drought in 40 years. <https://www.climatechangenews.com/2021/05/13/southern-madagascar-risk-famine-amid-worst-drought-40-years/>

⁴ Bringing Safe, Clean Water and Better Sanitation to Madagascar | UNICEF USA

The Madagascar government has taken some steps to address the water scarcity crisis, such as The National Water Project (NWP).⁵ However, more must be done to ensure sustainable water access for all. Government policies ought to focus on improving water resource management, investing in water infrastructure, and educating the public on water conservation. It is also important to consider the needs of marginalized communities, who are often disproportionately affected by water scarcity. Therefore, this research examines the extent to which government water policies in Madagascar impact community water habits with the goal of promoting a more sustainable future. It delves into the intricate web of government policies and their outcomes, with a focus on the experiences of marginalized communities. By unraveling the policy landscapes and assessing their effectiveness, this study aims to identify opportunities to improve climate preparedness, ensure sustainable water access, and mitigate the dire consequences of water scarcity in Madagascar.

1.2 Discussion of Key References and Their Limitations

In our research to explore the interconnection between water scarcity, community habits, and government policies in Madagascar, we examined three key references provided to us: McArthur, Amar Bhattacharya, Homi Kharas, Mertz, et al., and Al-Zu'bi. These references, while informative in their own right, collectively shed light on certain limitations that are pertinent to our research focus on the impact of government policies on water resource management and clean water access in Madagascar.

Each of these references offers valuable insights into the challenges developing nations face and their vulnerability in the context of climate change. McArthur, Amar Bhattacharya, and Homi Kharas emphasize the vulnerabilities of emerging markets and developing economies (EMDEs) and their need for support from advanced economies.⁶ Mertz et al. stress the importance of adaptation strategies in developing countries.⁷ Al-Zu'bi's work highlights the need for intersectoral approaches in climate change governance.⁸ However, when considering

⁵ Madagascar: \$220 Million to Improve Basic Water and Sanitation Services and Supply

⁶ Why developing country voices will shape the global climate agenda | Brookings, <https://www.brookings.edu/research/why-developing-country-voices-will-shape-the-global-climate-agenda/>

⁷ Adaptation to Climate Change in Developing Countries | SpringerLink, <https://doi.org/10.1007/s00267-008-9259-3>

⁸ Jordan's climate change governance framework: from silos to an intersectoral approach | SpringerLink, <https://doi.org/10.1007/s10669-016-9602-9>

our specific case study in Madagascar, these references collectively fall short in addressing the intricate relationship between government policies, water resource management, and clean water access. None of the references directly address the impact of government policies on these critical aspects in Madagascar. Their discussions, while relevant in a broader context, do not delve into the local dynamics and concrete policy actions taken by the Madagascan government to mitigate climate-induced water scarcity and improve access to clean water.

These limitations underscore the significance of our research, which aims to provide a focused examination of Madagascar's unique challenges concerning water scarcity, community action, and government policies. We will explore a specific government policy in Madagascar and its effects on community water consumption habits, water resource management, clean water access, and their broader implications for climate adaptation. By doing so, we aspire to bridge the existing gap in the literature and contribute to a more comprehensive understanding of the multifaceted water and climate challenges faced by Madagascar.

Literature Review

During our initial literature review, we understood that the aforementioned three sources did not address the specific country we wished to focus our research on to analyze trends of climate-related impact. Therefore, we sought out several new literature sources that address Madagascar and analyzed data regarding water sustainability within the country.

Our literature review addresses and analyzes the hazardous results of climate change on the island of Madagascar. Madagascar's position as an island in the southern part of the Indian Ocean off the coast of Africa offers a unique set of circumstances and conditions that make Madagascar vulnerable to climate change. This is compounded by the fact that Madagascar has an environment “favorable to the development of fauna and flora that are most unique in the world.”⁹ This situation means Madagascar is at a higher risk for climate change-related consequences and disasters than most countries worldwide.

The first article we analyzed, *A detailed study of climate change and some vulnerabilities in Indian Ocean: A case of Madagascar island*, seeks to address and measure the impact of

⁹ Modeste Kameni Nematchoua et al., “A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island,” *Sustainable Cities and Society* 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

various climate-related phenomena across multiple regions and situations within Madagascar, providing empirical data to show the “instability and vulnerability of Madagascar in the face of climate change” and how the conditions have worsened for the environment, the population, and the region.¹⁰ This provides much of the empirical data we can utilize to demonstrate the effects of climate change, including the effects on water sustainability within Madagascar and how it can vary across multiple regions on the island. However, for the purpose of our study, it fails to provide sufficient policy examples of how Madagascar has attempted to mitigate these effects, allowing us more room to explore alternative research for policy documentation.

The second article, *The Impact of Rainfall on Drinking Water Quality in Antananarivo, Madagascar*, provided an in-depth study of the deterioration in water quality in the capital city of Madagascar, Antananarivo. The article addresses “between rainfall patterns and microbial water quality,” especially within a relatively poorly developed city such as Antananarivo.¹¹ This literature is key in providing an empirical observation of how the quality of water, impacted by climate (through rainfall) can have consequences for the country's population. This can better give us information on how to quantify the change in water through various mediums. However, it does not describe any policies the Madagascar government, or the city government, have taken to mitigate or solve this issue. It also fails to address what potential actions or input the community of Antananarivo has expressed or how they have been impacted by changes in water quality. This will also give us room to explore potentially more refined and focused policy documentation implemented to mitigate these climate-related issues.

Overall while our literature provided the key data we can use to move forward for empirical analysis, these cases fail to address which policies the Madscagan government has used or any survey data from the local populace of Madagascar and how changes in water quality have impacted them. This highlights the gap in our research which we will need to address going forward to answer our research question. Given these understandings of our references and what they failed to address, this led us to our final research question: *How do community voices and government policies impact water scarcity in Madagascar?* By exploring this question and topic,

¹⁰ Modeste Kameni Nematchoua et al., “A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island,” *Sustainable Cities and Society* 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

¹¹ Bastaraud, Alexandra, et al. "The impact of rainfall on drinking water quality in Antananarivo, Madagascar." *PloS one* 15.6 (2020): e0218698.

we aim to provide valuable insights and recommendations for furthering progress in mitigating Madagascar's water crisis.

Conceptual Framework

After reviewing the existing research surrounding the influence of water scarcity on Madagascar's climate preparedness, as well as the gaps within that research, we propose our research can expand the knowledge of the subject using the following conceptual framework, displayed in *Figure 1.1*. We will be using this framework to investigate our proposed hypothesis: *Government water policies and community water habits decrease the level of water scarcity in Madagascar.*

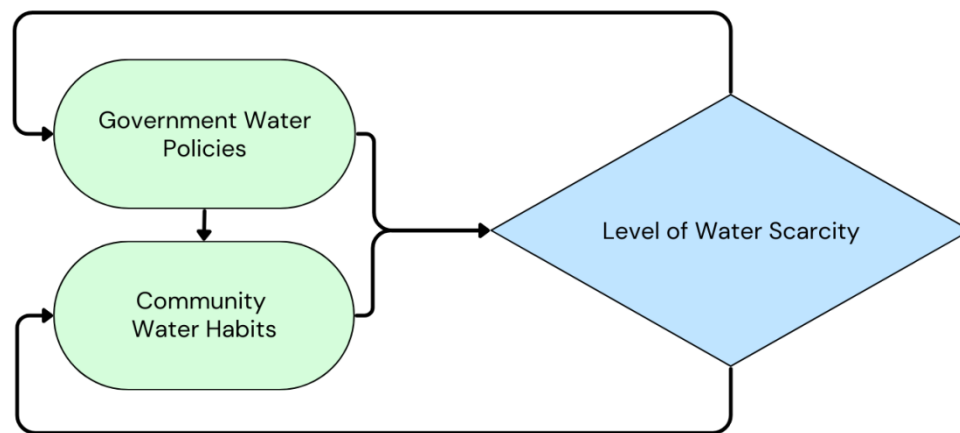


Figure 1.1: Causal pathway between Government Water Policies, Community Water Habits, and their influence on Water Scarcity.

This theoretical framework was derived from the Nematchou, et al. 2018 and Bastaraud, et al. 2020 studies included in the literature review, where results indicated a cyclical relationship between the implementation of government water policies and the level of water scarcity.¹² This study will focus on expanding that theoretical understanding to include the influence of

¹² Bastaraud, Alexandra, et al. "The impact of rainfall on drinking water quality in Antananarivo, Madagascar." PloS one 15.6 (2020): e0218698.
Modeste Kameni Nematchoua et al., "A Detailed Study of Climate Change and Some Vulnerabilities in Indian Ocean: A Case of Madagascar Island," Sustainable Cities and Society 41 (August 1, 2018): 886–98, <https://doi.org/10.1016/j.scs.2018.05.040>.

community water consumption habits throughout Madagascar, both how they are affected by government water policies and how they influence nationwide levels of water scarcity. This piece of the causal pathway has not been specifically defined in the existing literature, but further study on it has been broadly recommended by the academic field surrounding this issue. In order to define the correlations between how government policies determine community water habits, a section of our data collection surveys will ask respondents to identify their awareness of government water restrictions/conservation policies and describe how these policies have influenced their water consumption within the last two years. In order to define the correlations between community water consumption and overall levels of water scarcity, a section of our data collection surveys will ask respondents to describe their perceived difficulty in accessing safe drinking water, and also compare this difficulty to what they experienced two years prior. Following this model will allow us to hone in on the role that community habits play within the larger cycle of water policies and water scarcity.

The nation of Madagascar already faces significant climate vulnerabilities as a result of its location, geographical characteristics, and poor climate infrastructure.¹³ Madagascar's unique position as a large island off the Southeastern coast of Africa makes it highly vulnerable to coastal cyclones, sea level rise, and climate-related floods (*Figure 1.2*).¹⁴ Each of these environmental challenges contributes to rising water insecurity in Antananarivo and the surrounding towns with water processing and sanitation capabilities. While various government policies have been implemented by the government of Madagascar in response to these risk factors, our study will use one of these policies as a central case study.

¹³ World Bank Group, "Madagascar: \$220 Million to Improve Basic Water and Sanitation Services and Supply," World Bank, June 20, 2022.

¹⁴ "World Bank Climate Change Knowledge Portal," n.d.

Average Annual Natural Hazard Occurrence for 1980-2020

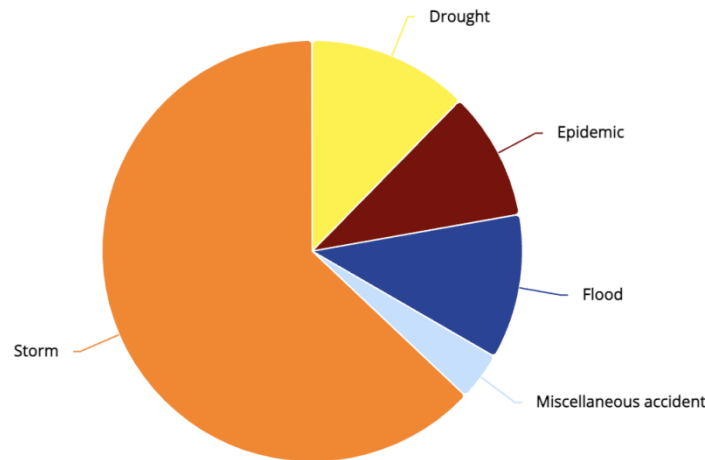


Figure 1.2: *Percentage of Annual Hazard Occurrence in Madagascar, 1980 - 2020.*

Within our theoretical framework, we will use Madagascar's National Water Project (NWP)¹⁵ as a case study for a nationwide government policy focused on water infrastructure and conservation. The NWP is a nationwide \$220 million initiative aimed at improving water security in Antananarivo and other cities across Madagascar, with a secondary focus on climate resiliency and emergency response.¹⁶ As part of the project, the NWP aims to repair over 700 water wells across Madagascar that are currently in various states of disrepair.¹⁷ Our aim with this portion of the framework is to measure how water scarcity has changed in Madagascar since the implementation of the NWP, as well as the influence the NWP has had on individual water consumption habits. Existing studies have failed to demonstrate the causal connections between the implementation of the NWP and its effect on water consumption at the community level. In our analysis, we intend to use the NWP as an example of a water policy that is representative of other Madagascan government policies regarding water security.

IRB and Ethical Considerations

¹⁵ "The Madagascar Water Project Inc - Clean Water, Poverty," The Madagascar Water Project, June 3, 2022.

¹⁶ "The Madagascar Water Project Inc - Clean Water, Poverty," The Madagascar Water Project, June 3, 2022.

¹⁷ The Madagascar Water Project, June 3, 2022.

Our research on water scarcity, community habits, and government policies in Madagascar demands a nuanced understanding of the ethical landscape. As we explore the intricate fabric of this unique environment, we must consider the multifaceted challenges associated with achieving informed and voluntary consent. Drawing insights from the "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research" paper by Elysée Nouvet and colleagues, published in the *Canadian Journal of Bioethics*, we can shed light on some key considerations.¹⁸

The linguistic landscape of Madagascar presents a challenge. Being a primarily Francophone country, with Malagasy as the official language, the role of translators becomes pivotal, especially as English might not be widely comprehended, more so in rural pockets. The process of 'back-translation' will be employed, starting with English questions which will then be translated into Malagasy or French.¹⁹ To ensure the sanctity of meaning, a second translator will translate these back into English. A team of 3-4 translators will be essential to ensure the consistency and accuracy of this procedure.²⁰

However, it's important to recognize, in line with Nouvet et al.'s observations, that certain technical terms lack precise equivalents in local languages. This linguistic challenge may introduce complexity to interviews, as participants may struggle to fully grasp these technical concepts.²¹ To mitigate this limitation, researchers, as emphasized by Nouvet and her colleagues, must proactively ensure that technical terms are explained clearly and with cultural sensitivity during interviews. This may involve simplifying language or providing practical examples to enhance participants' understanding while preserving research data accuracy.

Alongside language and translation challenges, cultural nuances, particularly those concerning gender, come into play. For example, some communities might view it as inappropriate for researchers of one gender to interview participants of the opposite gender. Fostering familiarity with local customs and heightened awareness of gender dynamics is crucial

¹⁸ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

¹⁹ Bullen, Pirooska Bisits. "How to Write Awesome Survey Questions - Part 1." Tools4dev, 26 Jan. 2022, tools4dev.org/resources/how-to-write-awesome-survey-questions-part-1/.

²⁰ Marshall, Catherine, et al. "Managing, Analyzing, and Interpreting Data." *Designing Qualitative Research*, Sage, Thousand Oaks, CA, 2014, p. 210.

²¹ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

to address this potential limitation. Our research approach includes the engagement of both male and female translators and field assistants. This proactive strategy ensures that research activities respect cultural norms and preferences while upholding ethical standards.

The influence of traditional leaders, known as "Les Chefs," in Malagasy communities, introduces a distinctive challenge to the principle of individual consent, as highlighted by Nouvet and her colleagues. Norms of respect for these leaders may require researchers to seek consent from them before approaching potential participants. The impact of leaders' approvals or refusals on individual participants' decisions remains ambiguous.²² In this context, researchers in our study should approach 'chiefs' respectfully and adhere to the necessary procedures for gaining permission to conduct research and interviews within their communities.

It's worth noting that politeness norms in some Malagasy communities prioritize agreement, and participants may hesitate to decline participation when invited.²³ This cultural aspect can present a challenge in the context of research, as participants may be hesitant to refuse participation when invited, fearing that declining may be perceived as impolite or disrespectful. Researchers must create an environment where participants are informed of their right to decline without fear of social repercussions. This emphasizes the need for clear and transparent communication, where participants are reassured that their decision to participate or not is entirely voluntary and respected.

The study also identified widespread apprehension among people in Antananarivo about signing or consenting to anything. Foreign documents, in particular, are met with mistrust.²⁴ This skepticism, as the study concluded, traces back to historical distrust stemming from colonial government missions when outsider researchers with dishonest intentions posed risks of harm and deception, as detailed by Nouvet and her colleagues in their work.

To address the widespread apprehension in Antananarivo, and other communities, about signing or consenting to foreign documents, our study will engage in community outreach and educational activities to build trust. We will prioritize transparency, collaborate with local partners, and demonstrate cultural sensitivity. Establishing feedback mechanisms, involving

²² Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 38.

²³ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

²⁴ Nouvet, Elysée, et al. "Consent to Research in Madagascar: Challenges, Strategies, and Priorities for Future Research." *Canadian Journal of Bioethics* 5.1 (2022): 36.

community members, and providing information about our research's ethical conduct are essential components of our strategy. Our goal is to overcome historical mistrust and ensure that our study respects the unique cultural and historical context of the communities in Antananarivo while upholding the highest ethical standards.

Furthermore, Madagascar's infrastructure woes pose a significant impediment to our research efforts. According to World Bank data, the availability of basic infrastructure, such as electricity and digital resources, is strikingly inadequate, especially when compared to Sub-Saharan Africa as a whole. To illustrate, in 2023, a mere 33.7% of the population has access to electricity, a figure that significantly lags behind the regional average of 48.4% recorded in 2020.²⁵ The repercussions of this infrastructure shortfall are dire, with over 18 million individuals lacking electricity access, a distressing statistic that places Madagascar 13th on the list of countries grappling with the largest unelectrified populations on a global scale.²⁶

Moreover, the World Bank data suggests that these challenges spill over into the domain of digital connectivity and broadband services. Despite some limited advancements in recent years, Madagascar continues to languish in terms of connectivity and accessibility. Internet usage has displayed a gradual uptick, with roughly 22% of the population gaining online access in 2021, compared to a meager 5.1% back in 2016. Nevertheless, this rate of penetration remains among the lowest worldwide and notably falls short of the 33% regional average observed in Sub-Saharan Africa.²⁷

These infrastructure limitations are critical considerations for our research, particularly in the context of data storage, member communication, and online research activities. The scarcity of electricity and limited access to the internet can impede our ability to engage with diverse communities in Madagascar effectively. In response to these challenges, we are committed to employing alternative communication methods and proactive awareness campaigns to bridge the

²⁵ "Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April 2023, <https://www.worldbank.org/en/news/press-release/2023/04/07/madagascar-afe-set-to-expand-access-to-renewable-energy-and-digital-services-thanks-to-400-million-credit>.

²⁶ Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April 2023, <https://www.worldbank.org/en/news/press-release/2023/04/07/madagascar-afe-set-to-expand-access-to-renewable-energy-and-digital-services-thanks-to-400-million-credit>.

²⁷ Madagascar Set to Expand Access to Renewable Energy and Digital Services thanks to \$400 Million Credit." The World Bank, 7 April 2023, <https://www.worldbank.org/en/news/press-release/2023/04/07/madagascar-afe-set-to-expand-access-to-renewable-energy-and-digital-services-thanks-to-400-million-credit>.

awareness gap and ensure that our research reaches and benefits as many people as possible in Madagascar.

From an ethical perspective, obtaining approvals from the Institutional Review Board (IRB) is an essential and non-negotiable step before commencing any research involving human subjects. The IRB plays a crucial role in ensuring that research involving human participants adheres to the highest ethical standards and follows established ethical guidelines. It is responsible for reviewing and monitoring research proposals to protect the rights, well-being, and privacy of research participants.

In the context of Madagascar, it's important to recognize that the country might have its indigenous review mechanisms in place. These indigenous review mechanisms could be specific to the local context and cultural norms. Researchers conducting studies in Madagascar should respect and adhere to these mechanisms when they exist. These mechanisms may offer additional layers of ethical oversight, tailored to the unique ethical considerations of the local community.

The inclusion of both IRB approvals and compliance with indigenous review mechanisms demonstrates a commitment to ensuring that the research is conducted ethically and in a manner that respects the local values, traditions, and ethical principles of the communities involved. This dual approach helps maintain the highest ethical standards while addressing any unique ethical considerations that may arise in the research context.

In our comprehensive study of water scarcity, community habits, and government policies in Madagascar, we recognize the intricate ethical landscape shaped by linguistic, cultural, and infrastructure challenges. Insights from Elysée Noveta and colleagues' research underscore the importance of addressing these complexities. Our approach involves meticulous translation, clear explanation of technical terms, and a diverse team to ensure meaningful and culturally sensitive consent.

Gender dynamics and the role of traditional leaders require respect and understanding. Historical mistrust about signing documents is addressed through community outreach and transparency. Furthermore, data from the World Bank highlights the significant disparities in infrastructure, with over 18 million people lacking access to electricity and limited internet penetration. Despite these challenges, our research endeavors to navigate this terrain while upholding the highest ethical standards and respecting the unique context of Madagascar's communities.

Methodology

With NWP being the case study for this project, this will entail a mixed-methods approach, which includes interviews and document analysis.²⁸ Qualitative data will be collected from in-person interviews and analyzed alongside existing quantitative data on Madagascar's level of water scarcity for contextual purposes, which would be in line with an "exploratory sequential research design" as described by Creswell and Clark.²⁹ The kinds of insights we hope to draw from the interviews in particular lie within the tentative coding scheme below. Coding in general will be necessary for this project in order to conduct a fruitful relational content analysis of the interview results. This will allow us to draw patterns between the water quality and availability in Southern versus Northern towns while taking into account the weather patterns, for example. Furthermore, the questions that will be coded are the ones most fundamental in answering the research question at hand. The inductive, anticipated themes are based on the contents of the literature review. These will then be further expanded upon through "in vivo" coding in the later stages of the data collection process as sub-themes emerge from the in-person interviews.³⁰

Data Collection

In terms of sample selection criteria, NWP seeks to increase clean water access in the cities and towns of Antananarivo, Antsiranana, Mahajanga, Antsirabe, Fianarantsoa, and Manakara, so stratified sampling will be utilized to interview a sample of residents from each of these cities.³¹ Conveniently, the geographic position of the preceding cities will provide a diversity of answers, since the cities are spread all across Madagascar. For example, according to the United States Agency for International Development (USAID), Southern Madagascar is said to be more drought-prone, while Eastern Madagascar experiences higher rates of precipitation.³² So, answers from Fianarantsoa (South) compared to Antsiranana (North) will allow the research

²⁸ Marshall, Catherine, et al. "The How of the Study: Building the Research Design." *Designing Qualitative Research*, Sage, Thousand Oaks, CA, 2014, p. 103.

²⁹ Creswell, John W., and Vicki L. Plano Clark. "Collecting Data in Mixed Methods Research." *Designing and Conducting Mixed Methods Research*, CORWIN Press INC, 2017, p. 185.

³⁰ Marshall, Catherine, et al. 2014, p. 218.

³¹ World Bank, June 20, 2022.

Creswell, John W., and Vicki L. Plano Clark, 2017, p. 177.

³² Madagascar Water Resources Profile Overview, United States Agency for International Development, winrock.org/wp-content/uploads/2021/08/Madagascar_Country_Profile-Final.pdf.

team to control for the differences in climate-induced weather events experienced by different parts of the island. Additionally, this sample will ideally mimic the age, income, and gender demographics of the Madagascan population.

As for the interview itself, it will be a semi-structured, in-depth interview with a combination of open- and closed-ended questions asked in person.³³ The interviews will be one-on-one between an interviewer and the interviewee to eliminate the risk of answers being swayed by the presence of other people. The interviews will need to be digitally recorded in order to back-translate the responses to English for the analysis phase.³⁴ Prior to the interviews, a survey needs to be disseminated to take note of any special accommodations, but most importantly, to note the native language of the interviewee, since both Malagasy and French are the official languages of Madagascar.³⁵ We will have interviewers who can speak either Malagasy, French, or both, so the research team is not limited to a certain sample of people within each city.

Another step to take place before conducting the interviews would be to create a focus group of select people from the sample to participate in a community mapping session. According to Preston City Council, community mapping is a participatory evaluation technique “...involving residents in identifying the assets of their neighborhood, looking at opportunities and creating a picture of what it is like to live there.”³⁶ In this project, a community map would give the research team an idea of the proximities between the interviewees and La Jiroso Rano Malagasy (JIRAMA) locations and the kinds of weather events that may affect where they get their water. JIRAMA is a state-run water company that distributes and manages water services in all regions of Madagascar.³⁷ It is also the same company that is being financially supported by the World Bank through the NWP.³⁸ Conducting a focus group to create a community map would essentially allow the research team to view a unique map of nearby water sources known by locals who live in each of the cities, and this map could also be utilized in the analysis phase to visualize the concentration of interviewees within each city. The outcome of the focus group

³³ Creswell, John W., and Vicki L. Plano Clark, 2017, p. 179.

³⁴ Creswell, John W., and Vicki L. Plano Clark, 2017, p. 180.

³⁵ Madagascar: The Impact of Language Policy and Practice on Children’s Learning: Evidence from Eastern and Southern Africa 2017, UNICEF, 2017, www.unicef.org/esa/sites/unicef.org/esa/files/2018-09/UNICEF-2016-Language-and-Learning-FullReport.pdf.

³⁶ The Community Mapping Toolkit, Preston City Council, ucanr.edu/sites/CA4-HA/files/206668.pdf.

³⁷ “JIRAMA.” Association of Power Utilities of Africa, APUA, apua-asea.org/en/page-de-profil-utilisateur/jirama-/profil/.

³⁸ World Bank, June 20, 2022.

may also lead the research team to refine interview questions if needed and solidify themes in the coding scheme, almost like the purpose of a “pilot study.”³⁹

Interview Questions and Coding Scheme

Background Questions:

1. What is your name?
2. What is your age?
3. What is the highest education level you have attained?
4. What is your employment status?
5. If applicable, what is your occupation?
6. What is your income (MGA biweekly)?
7. What neighborhood/city do you live in?
8. How many people live in your household, and what is their relationship to you?

Water Usage and Access Questions:

1. What do you use water for on a daily basis?
2. Who or what is your primary source of water?
3. Do you track your water usage?
 - a. If so, can you estimate the amount of water you use on a daily basis?
4. Please describe how easy or difficult it is to acquire water that is sufficient for you and your household’s daily needs.
5. What is different from your daily water needs *2 years ago*?
 - a. Please describe how easy or difficult it was to acquire water that was sufficient for you and your household’s daily needs *2 years ago*.
6. Please describe the *current* water quality from your primary water source.
7. Please describe the water quality from your primary water source *2 years ago*.

Policy Perception and Awareness Questions:

1. Are you aware of any government water restrictions/policies?

³⁹ Marshall, Catherine, et al. 2014, p. 105.

2. Are you aware of the National Water Project?
 - a. If so, what do you know about the National Water Project?
3. To what extent government water restrictions/policies have influenced your water consumption within the last two years?
4. In your opinion, how has the National Water Project (initiatives) contributed to your water quality and access in your community?

Other Questions:

1. Is there anything else you would like to share about your water usage, water access, or relevant policies?

	Key Questions	Responses (Clusters/Themes) ⁴⁰	Sub-clusters
1	What neighborhood/city do you live in?	Antananarivo	
		Antsiranana	
		Mahajanga	
		Antsirabe	
		Fianarantsoa	
		Manakara	
2	What is your primary source of water?	Groundwater	
		River water	
		Community fountain	
		Rainwater	

⁴⁰ Marshall, Catherine, et al. 2014, p. 221.

		Tapwater (house)	
		Other	
3	Please describe the quality of water from your primary source. <i>(Applicable to current and two years before NWP.)</i>	Clean	
		Dirty	
4	Please describe how easy or difficult it is to acquire water that is sufficient for you and your household's daily needs. <i>(Applicable to current and two years before NWP.)</i>	Easy	
		Neutral	
		Difficult	
5	Are you aware of any government water restrictions/policies?	Yes	
		No	
6	Are you aware of the National Water Project?	Yes	
		No	
7	To what extent have government water restrictions/policies influenced your water consumption within the last two years?	Influential	
		Neutral	
		Not influential	
8	In your opinion, how has the National Water Project (initiatives) contributed to your water quality and access in your community?	Big contribution	
		Neutral	
		Little to no contribution	

Analytical Methods Qualitative Group Project:

Somali Climate Refugees and Measuring Well-being in Camps

December 4, 2023

Abstract

Climate change has caused a surge in climate-induced displacement, disproportionately affecting developing nations like Somalia. Severe drought has led to thousands of casualties and one million displaced since 2015, straining overcrowded and underfunded refugee camps, highlighting the need for urgent solutions to improve the well-being of climate refugees. Developing countries bear a disproportionate climate change burden, emphasizing the importance of local community involvement in climate initiatives. However, many policies need more consideration of local perspectives. Scholars advocate for policies addressing climate mitigation and adaptation, highlighting the effectiveness of local engagement. Previous research stresses the need for improved social support and vocational training in refugee camps, which can enhance refugees' well-being. This research explores whether implementing climate development training in refugee camps could improve the short and long-term well-being of Somali climate refugees. This research focuses on Somali climate refugees in camps in Kenya and Ethiopia. It involves interviews and focus groups, aiming to provide policy recommendations to enhance the refugees' well-being, improve refugee camp conditions, and increase Somali involvement in addressing climate change. Results indicate that these proposed programs would significantly improve well-being of refugees while in camps and in the future, and that the skills learned could be used by refugees to contribute to mitigating climate problems in Somalia if they are ever to return.

Background

Climate change is a worsening issue that has become prominent on the international stage in recent years. Its effects have forced many to flee their homes, becoming internally displaced people (IDPs) and refugees. Although not an officially recognized term, climate refugee today is now commonly used by those discussing the forced displacement by climate outside of their home country's borders.¹ Climate change and natural disasters represent the majority of the 60.9 million people displaced since 2022, an increase of 8.7 million from 2021.² While climate change and climate-induced displacement are multinational issues, underdeveloped states suffer more than developed states. On top of having to develop health care and education, build infrastructure, and grow the economy, developing countries are engulfed by the effects of climate change.³ Specifically, the regions, including the Horn of Africa, South Asia, and Caribbean islands, are disproportionately affected by climate change and have less capital to respond to climate problems.

Somalia is one of the countries facing this significant increase in environmentally displaced people, with the Horn of Africa's worst drought in 40 years exacerbating its existing conflict-driven refugee crisis. The drought has claimed the lives of 43,000 people and displaced one million since it began in 2015.⁴ Since 1991, 3.8 million people have been displaced internally, and 714,390 have fled to neighboring countries due to conflict, instability, and the emergence of terrorist organizations.⁵ These 714,390 refugees are seeking asylum in neighboring countries like Kenya (308,367), Ethiopia (276,412), Uganda (69,533), and Yemen (46,750).⁶ Somali defection continues to be a growing problem for both surrounding states and the Somali Government.

The pattern of conflict-driven displacement that climate issues have now exacerbated has led to a severe strain on already crowded and underfunded refugee camps in neighboring countries as food sources are now beginning to diminish because of the lack of water to farm and feed people. Camps often run into a myriad of problems, such as a lack of clean food and water, diminished medical resources, and there are almost no plans for how to transition people back into society. These problems result in poor living conditions and refugees staying at camps for a long time. With climate-based refugee cases continuing to increase, we focused our research on addressing the issues that affect the well-being of this underrepresented population.

To address the unmet needs and well-being of climate refugees in camps and contribute to possible climate mitigation approaches, we sought to explore whether implementing climate development training in refugee camps could improve the short- and long-term well-being of Somali climate refugees. To answer this question, we looked at the experiences of Somali

¹ Migration Data Portal. 2023. "Data on statistics on environmental migration." Migration Data Portal. https://www.migrationdataportal.org/themes/environmental_migration_and_statistics.

² UNHRC. 2023. "Somalia Refugee Crisis Explained." USA for UNHCR. <https://www.unrefugees.org/news/somalia-refugee-crisis-explained/>.

³ Bhattacharya, Amar, Kharas, Homi, McArthur, John "Why Developing Country Voices Will Shape the Global Climate Agenda." *Brookings*, 27 July 2022, <https://www.brookings.edu/research/why-developing-country-voices-will-shape-the-global-climate-agenda/>.

Mertz, O., Halsnæs, K., Olesen, J.E. *et al.* Adaptation to Climate Change in Developing Countries. *Environmental Management* 43, 743–752 (2009). <https://doi.org/10.1007/s00267-008-9259-3>

⁴ UNHRC. 2023. "Somalia Refugee Crisis Explained." USA for UNHCR. <https://www.unrefugees.org/news/somalia-refugee-crisis-explained/>.

⁵Ibid.

⁶Ibid.

climate refugees residing in camps in Ethiopia and Kenya. We conducted interviews and focus groups while using the PERMA model of well-being to assess the possible benefits of implementing a climate development training program within refugee camps. We used our findings to serve as the foundation for our policy and program design recommendations, with two main goals in mind: 1) a short-term goal of enhancing the well-being and quality of life within these refugee camps and 2) the long-term goal of increasing Somali involvement in mitigating and adapting to climate change in Somalia. We found that Somali refugees have an interest in climate-specific vocational training in refugee camps. Results also indicate that these proposed programs would significantly improve well-being of refugees while in camps and in the future, and that the skills learned could be used by refugees to contribute to mitigating climate problems in Somalia if they are ever to return.

Literature Review

It is widely acknowledged that developing countries endure a heavier burden of climate change than developed countries and must be the focus of climate mitigation efforts. The most effective climate initiatives include members of the local community. Yet, many policies aimed at mitigating climate effects in developing countries need to have their perspective or consider their program engagement. Scholars agree that despite not being the major contributor to climate change, developing countries bear the most significant burden of the adverse effects.⁷ Consequently, policies are needed for these countries to both mitigate and adapt to the impacts of climate change.⁸ Research has shown that a failure to include local populations limits the impact of climate mitigation and adaptation initiatives.⁹ Adaptation that takes place at the local level is more effective than “imposing nationally decided adaptation options,”¹⁰ emphasizing the need to engage citizens in problem-solving processes.¹¹ Three broad goals for a “global green transition” are outlined in Bhattacharya et al., but the provided solutions are vague, lacking precise and realistic implementation strategies.¹² Additionally, many of the top-down approaches address an unspecific international community or possible national governments.¹³ Ironically, Bhattacharya et al.’s policy brief entitled, “Why developing country voices will shape the global climate agenda” seems to leave out these “developing country voices” and fails to suggest how to involve the local community in climate solutions.¹⁴ While climate change is a growing challenge

⁷ Bhattacharya, Amar, Kharas, Homi, McArthur, John “Why Developing Country Voices Will Shape the Global Climate Agenda.” *Brookings*, 27 July 2022, <https://www.brookings.edu/research/why-developing-country-voices-will-shape-the-global-climate-agenda/>.

Mertz, O., Halsnæs, K., Olesen, J.E. *et al.* Adaptation to Climate Change in Developing Countries. *Environmental Management* 43, 743–752 (2009). <https://doi.org/10.1007/s00267-008-9259-3>.

Al-Zu’bi, M. Jordan’s climate change governance framework: from silos to an intersectoral approach. *Environ Syst Decis* 36, 277–301 (2016). <https://doi.org/10.1007/s10669-016-9602-9>.

⁸ Ibid.

⁹ Al-Zu’bi, M. Jordan’s climate change governance framework: from silos to an intersectoral approach. *Environ Syst Decis* 36, 277–301 (2016). <https://doi.org/10.1007/s10669-016-9602-9>.

¹⁰ Eriksen SH, O’Brien K (2007) Vulnerability, poverty and the need for sustainable adaptation measures. *Climate Policy* 7:337–352 P. 750.

¹¹ Al-Zu’bi, M. Jordan’s climate change governance framework: from silos to an intersectoral approach. *Environ Syst Decis* 36, 277–301 (2016). <https://doi.org/10.1007/s10669-016-9602-9>.

¹² Bhattacharya, Amar, Kharas, Homi, McArthur, John “Why Developing Country Voices Will Shape the Global Climate Agenda.” *Brookings*, 27 July 2022, <https://www.brookings.edu/research/why-developing-country-voices-will-shape-the-global-climate-agenda/>.

¹³ Ibid.

¹⁴ Ibid.

confronting developing countries, the lack of engagement of developed countries, specifically their citizens, in climate solutions is prominent in policy suggestions. Because it is shown that emphasizing the local community in climate initiatives leads to more effective outcomes, our research aims to not only highlight the perspectives of those most impacted by climate change but also directly involve Somali citizens in learning how to participate in these solutions to improve their well-being and that of their country.

Research suggests various ways the local population can become more involved in climate solutions and resulting positive benefits. Programs can focus on both behavior and skill interventions. Finally, the research discusses specific environmental sector engagement. Al-Zu'bi claims that many people in developing countries do not participate in climate initiatives because they are concerned it will negatively affect their social and economic development.¹⁵ Thus, climate change development programs should aim to change the behavior of the public with a long-term focus and must work to develop core skills and competencies of citizens.¹⁶ Researchers suggest that policies should focus on developing certain infrastructure sectors to reduce vulnerability to climate change, including energy, transport, water supply, and agricultural techniques.¹⁷ Developing these sectors could both “counter impacts of climate change” and “improve the economic and social welfare and thereby improve the adaptive capacity of individuals and communities.”¹⁸ To improve the involvement and prioritization of climate refugees within climate solutions, our research aims to consider general education and behavioral aspects and the potential sectors where refugees could get involved.

Previous research examining living conditions and well-being in refugee camps identified several resources that may improve refugees' living conditions and well-being in refugee camps. Research is mixed on whether material resources are (un)satisfactory, but camps frequently need more social programs and support services. De Bruijn assesses refugees' well-being and living conditions in camps using UNHCR's Standards and Indicators Data from six countries across Africa and Asia, focusing on gender-related issues, legal protections, health, education, coping strategies, and food security.¹⁹ Some research has found that access to material resources, including food, water and sanitation, education, and health, has been largely satisfactory.²⁰ Other research has found, however, high rates of malnutrition,²¹ contaminated food and water,²² and limited access to primary and emergency health care.²³ Noting that many refugees in camps

¹⁵ Al-Zu'bi, M. Jordan's climate change governance framework: from silos to an intersectoral approach. *Environ Syst Decis* 36, 277–301 (2016). <https://doi.org/10.1007/s10669-016-9602-9>

¹⁶ Ibid.

¹⁷ Mertz, O., Halsnæs, K., Olesen, J.E. et al. Adaptation to Climate Change in Developing Countries. *Environmental Management* 43, 743–752 (2009). <https://doi.org/10.1007/s00267-008-9259-3>

¹⁸ Boko A, Niang I, Nyong A, Vogel C, Githeko A, Medany M, Osman Elasha B, Tabo R, Yanda P (2007) Africa. In: Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE (eds) Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the fourth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge, pp 433–467

¹⁹ De Bruijn, Bart. 2009. “The Living Conditions and Well-Being of Refugees.” *Human Development Research Paper* 25 (July). https://mpr.ub.uni-muenchen.de/19208/1/MPRA_paper_19208.pdf.

²⁰ Ibid.

²¹ Skinner, Annabel, Michelle Caroline Tester-Jones, and Daniele Carrieri. "Undernutrition among children living in refugee camps: a systematic review of prevalence." *BMJ open* 13, no. 6 (2023): e070246.

²² Garsow, Ariel V., Emily Campbell, Gary Closs Jr, and Barbara B. Kowalczyk. "Food Safety Challenges in Refugee Camps: What Do We Know?." *Journal of Food Protection* 84, no. 5 (2021): 876-884.

²³ Farnakioti, Evangelia, Magdalini Pylli, and Konstantinos Giannakou. "Access to healthcare services and essential medicines in GREEK migrant camps: an online cross-sectional study." *Journal of Immigrant and Minority Health* 25, no. 3 (2023): 580-588.

experienced traumatic experiences before and upon arrival, researchers argue that social support, including access to psychologists, is limited in refugee camps but could benefit refugees' coping and mental well-being.²⁴ Hussam et al. state that because short-term needs, such as food, shelter, education, and health, are typically prioritized, long-term needs and related programs, such as employment and vocational training, are often overlooked.²⁵ In summary, while various resources impact the well-being of refugees, social programs are most lacking, especially psychological care and employment-related programs, which may significantly impact refugee well-being. We aim to address this need for social support by attempting to improve the well-being of climate refugees in camps, focusing on employment within green or climate-related sectors.

If vocational training programs are well-designed, they can equip refugees with the skills needed to find employment and improve their short- and long-term well-being, even while still in the camps. The UNHCR recommends that Technical and Vocational Training and Educational (TVET) programs for displaced persons include certain features, such as inclusion, market orientation, support services, and life skills.²⁶ Researchers explain that TVET benefits the social well-being of refugees by building “self-awareness and self-esteem, strengthened interpersonal, citizenship, communication, and entrepreneurial skills.”²⁷ Research has found that employment, specifically the “experience of working, itself,” significantly improves the psychosocial well-being of refugees in camps, especially among men.²⁸ An examination of a vocational training program for women refugees at a camp in Jordan found that the program provided women with increased confidence and self-esteem, business and entrepreneurship skills, and “hope and opportunities.”²⁹ Vocational training programs offer climate refugees the skills needed to improve their short and long-term well-being by obtaining the skills needed to find employment, even while in the camps. Our research seeks to achieve this dual advantage by empowering local communities to participate actively in climate initiatives. To achieve this, we will design a vocational and skill training program with a climate focus that can enable refugees to be reskilled for climate-relevant sectors while also improving refugees' well-being while in the camps.

There is consensus among scholars that the disproportionate impact of climate change on developing countries highlights their need to be at the forefront of climate mitigation efforts. While it is widely acknowledged that involving local communities is crucial for successful

De Bruijn, Bart. "The living conditions and well-being of refugees." (2009).

²⁴Ibid

Farmakioti, Evangelia, Magdalini Pylli, and Konstantinos Giannakou. "Access to healthcare services and essential medicines in GREEK migrant camps: an online cross-sectional study." *Journal of Immigrant and Minority Health* 25, no. 3 (2023): 580-588.

²⁵ Hussam, Reshmaan, Erin M. Kelley, Gregory Lane, and Fatima Zahra. "The Psychosocial Value of Employment: Evidence from a Refugee Camp." *American Economic Review* 112, no. 11 (2022): 3694–3724. <https://doi.org/10.1257/aer.20211616>.

²⁶ The UN Refugee Agency, *Key considerations on Technical and Vocational Education and Training (TVET)* (2019) Education Brief <https://www.unhcr.org/us/media/key-considerations-technical-and-vocational-education-and-training-tvet>

²⁷ Galguera, Miriam P. 2018. "The Influence of UNESCO in Botswana and Namibia." In *Globalization, Mass Education and Technical and Vocational Education and Training*. N.p.: Springer Cham. <https://doi.org/10.1007/978-3-319-91107-6>.

²⁸ Hussam, Reshmaan, Erin M. Kelley, Gregory Lane, and Fatima Zahra. "The Psychosocial Value of Employment: Evidence from a Refugee Camp." *American Economic Review* 112, no. 11 (2022): 3694–3724. <https://doi.org/10.1257/aer.20211616>.

²⁹ Jabbar, Sinaria Abdel, and Haidar Ibrahim Zaza. "Evaluating a Vocational Training Programme for Women Refugees at the Zaatari Camp in Jordan: Women Empowerment: A Journey and Not an Output." *International Journal of Adolescence and Youth* 21, no. 3 (2015): 304–19. <https://doi.org/10.1080/02673843.2015.1077716>.

climate initiatives, current policies often overlook the perspectives and engagement of affected individuals in developing countries. Our research aims to address this gap by amplifying the voices of those impacted by climate change, actively involving Somali climate refugees in climate solutions, and drawing insights from prior studies on effective engagement strategies. Additionally, research finds a lack of social programs and support services in refugee camps, despite their role in improving climate refugees' well-being in camps. Our research focuses on mitigating climate challenges and improving well-being in refugee camps, strongly emphasizing empowering local communities. We propose implementing climate-focused vocational training programs in refugee camps to equip refugees with skills to improve their well-being.

Theory

Our team aims to design a climate-focused training program to improve the well-being of refugees. We needed a model to measure and evaluate well-being that would allow us to assess which areas of well-being are not being met accurately. In turn, we will design a training program that satisfies the identified areas of well-being. This will allow us to ensure our program is designed with well-being distinctly in mind. For our research, we decided to utilize a theory of well-being developed by Dr. Martin Seligman to apply a standard of well-being to the experiences of Somali climate refugees. Dr. Seligman explains that research shows that measuring well-being can give insights into the relationship between feelings and their implications.³⁰ Primarily in psychology, there are various approaches to measure well-being; however, our study on Somali climate refugees will adopt the PERMA theory of well-being. The PERMA theory, grounded in positive psychology, represents “the scientific examination of the factors that enable individuals and communities to thrive.”³¹ PERMA is an acronym for Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment.

While numerous well-being theories and measurement methods exist, the PERMA theory is one of modern psychology's most widely accepted and comprehensive theories. It offers a more holistic perspective on well-being by considering multiple facets rather than focusing on a single or limited number of variables. Seligman states that individuals can “flourish” when they meet the criteria for well-being outlined in this theory. The PERMA theory is often applied when using statistical analysis to gauge an individual's alignment with well-being standards; however, our study will employ this model to inform our research design and analysis.

³⁰ University of Pennsylvania. 2023. “PERMA Theory of Well-Being and PERMA Workshops | Positive Psychology Center.” Positive Psychology Center. <https://ppc.sas.upenn.edu/learn-more/perma-theory-well-being-and-perma-workshops>.

³¹ Ibid.

POSITIVE EMOTIONS	"Route to well-being is to increase positive emotion."
ENGAGEMENT	"An experience in which someone fully deploys their skills, strengths, and attention for a challenging task."
RELATIONSHIPS	"Experiences that contribute to well-being are often amplified through our relationships."
MEANINGS	"Sense of meaning and purpose can be derived from belonging to and serving something bigger than oneself"
ACCOMPLISHMENTS	"People pursue achievement competence, success, and mastery for its own sake, in various domains."

UNIVERSITY OF PENNSYLVANIA. 2023. "PERMA" THEORY OF WELL-BEING AND PERMA" WORKSHOPS | POSITIVE PSYCHOLOGY CENTER." POSITIVE PSYCHOLOGY CENTER. [HTTPS://PPC.SAS.UPENN.EDU/LEARN-MORE/PERMA-THEORY-WELL-BEING-AND-PERMA-WORKSHOPS](https://ppc.sas.upenn.edu/learn-more/perma-theory-well-being-and-perma-workshops).

Figure 1

Methods

Somali climate refugees were selected because of the increased displacement due to the rising effects of climate change and drought. These Somali climate refugees have primarily fled to Kenya and Ethiopia as their countries of asylum, with 308,367 going to Kenya and 276,412 going to Ethiopia.³² The specific refugee camps we chose were based on the long-term pivot camps have taken to continue providing housing for displaced individuals. Moreover, the camps we chose were established around the same time, making their grouping all the more natural³³. The camp choice was decided based on size, percentage of Somalis inside the camp, time since establishment, and if the camps had become long-term solutions.³⁴ Furthermore, acknowledging the diversity of camp attributes such as relative location to urban population centers and the complexity of establishing qualitatively identical units of analysis due to factors such as occasional refoulement policies adopted by host nation governments, we chose to analyze camps with comparable population sizes and years established *by country*. Hence, we analyze Kenyan camps with similar values and Ethiopian camps with similar values for these variables.

³² UNHRC. 2023. "Somalia Refugee Crisis Explained." USA for UNHCR. <https://www.unrefugees.org/news/somalia-refugee-crisis-explained/>.

³³ Hesse-Biber, Sharlene Nagy, ed. *Feminist research practice A primer*. Sage Publications, 2013.Ch.8

³⁴ Seawright, Jason, and John Gerring. "Case selection techniques in case study research: A menu of qualitative and quantitative options." *Political research quarterly* 61, no. 2 (2008): 294-308.

The Camps Selected for Our Study Are³⁵:

Host Country	Camp Name	Year Established	Total Refugee Population	Month/Year Recorded	Reporting Agency
Kenya	Dagahaley	1992	72,568	March 2020	UNHCR
Kenya	Ifo	1991	68,773	March 2020	UNHCR
Ethiopia	Kebribeyah	1988	18,043	September 2023	UNHCR
Ethiopia	Aw-barre	1988	13,413	September 2023	UNHCR

Our consisted of interviews and focus groups. For all three methods, translators were selected from camp administrative staff (where they exist) or pre-existing volunteer groups already operating within the camps to assist with the perception of localized nuance inaccessible to outsiders. This had the added advantage of accelerating the establishment of trust between our team and refugee participants in that it would leverage already-established relationships. To account for any cultural norms of public gender association within the predominantly Muslim Somali population, female researchers were paired with female translators and worked to interview female participants - and vice versa for males.

Given the possibility that camp administration may not centrally locate Somali climate refugee populations if others exist in their respective boundaries, we relied on demographic data from camp administrative staff to help identify which persons within their boundary have been verified as originating from Somalia. A preliminary interview question guide is provided below. We have designed these to be intentional in their ability to guide interviewees to discuss their experiences as refugees relevant to the five PERMA categories and gauge the potential for the value of these categories to increase were climate-centered occupational training to be provided to them. When refining our interview questions in preparation for focus groups, we kept the PERMA model in mind and asked questions that still covered the five categories. However, we allowed and encouraged digression from initial questions if the interviewees' responses seemed relevant and to promote a depth of refugee perspectives and experiences. Interview and focus group responses were transcribed based on audio recordings taken, coded, and analyzed to help answer our research question and, ideally provide policy recommendations regarding what programs can be instituted to amplify these refugees' well-being following the PERMA framework.

³⁵ Overview of Refugee camps and sites September 2023, <https://data.unhcr.org/en/documents/details/104087>

To incentivize participation in all phases of our research, we will provide participants who complete each phase (where applicable) with compensation in the form of commodities in short supply in their respective camps or the currency of the host nation where opportunities exist within the camps to spend money. Respondents will choose between the two options, which will be of equal monetary value, where applicable. Furthermore, the interviews were annotated with disclaimers for the respondents to understand how we intended to use/share the data that they provided and emphasized their right to terminate participation at any time - given the difficult nature of openly discussing the traumatic experiences that led to and continued displacement from their homeland. To account for this phenomenon in our efforts to collect as much freely expressed qualitative data as possible, our research team will also coordinate the provisioning of on-site mental health care services in an attempt to give voice to refugees who might otherwise choose not to share data that is integral to understanding their experience and well-being.

We used the five defined characteristics of the PERMA theory of well-being as a framework for our coding and analysis. Our research utilized the two-cycle coding strategy outlined by Johnny Saldaña.³⁶ The interviews took place across the four refugee camps, interviewing 50 people 18-40 from each (200 total) over a year. After completing and compiling the data, our first cycle consisted of assigning short, simplified descriptions to responses relevant to our research. We noticed a few recurring themes, identified them according to different colors, and placed specific content under the general ideas into a t-chart. Then, we identified common themes throughout the interviews and color-coded them accordingly to see which were most prominent.³⁷ For our second cycle, we used pattern coding to begin to categorize the responses as one of the five aspects of PERMA: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment, marking each of the statements we found from cycle one with the letter equivalent to the categories.³⁸ While a main point was searching for positive comments on well-being, we also investigated areas from the PERMA theory that were being unmet or needed improvement. For example, suppose an interviewee stated that they ‘longed for my old job...my days now feel aimless’. In that case, a researcher might record a ‘feeling lack of purpose’ for the first-cycle phrase and, in the second cycle, infer that the interviewee’s need for meaning and/or accomplishment has not been met.

Using our findings from the semi-structured interviews, we designed focus group questions to discuss possible program characteristics and how such programs could improve the aspects of well-being from PERMA. Our team applied the aforementioned first and second-round coding strategies for each of our five interview participants to identify recurrent themes and subsequently associate them with the five tenants of the PERMA model of well-being. Following our team’s discussion on the comparative presence or shortage of the different PERMA tenants across our interview responses, we generated the focus group questions listed below. The selected participants were 18-45 and had been living in their respective camps

³⁶ Saldaña, Johnny. 2009. *The Coding Manual for Qualitative Researchers*. N.p.: Sage.

³⁷ Ibid.

³⁸ Ibid.

for 5-10 years. Once all data had been analyzed, we synthesized findings from the interviews and focus groups in a discussion section. We proposed camp design or policy recommendations that could improve the well-being of refugees in a final research paper.

After the interviews, insights from the final question regarding unaddressed experiences will guide the refinement of our future interview questions. Additionally, suppose the interview participants identify the presence of immediate or extended family members or refugees from the same point of origin within the camp. In that case, we will request to interview them to gain a more comprehensive and precise understanding of their experiences, as these relationships likely influence the well-being of the interviewees. If an interview participant identifies the presence of refugees from their same point of origin in Somalia within the camp, we will request to interview them to obtain a more comprehensive and precise understanding of the experiences of individuals displaced from the same regions.

Ethical Considerations

Our team submitted a proposal to the IRB (Institutional Review Board). The proposal outlined the goals of our project, the risks and benefits, and how the refugees were recruited to ensure their safety. Because of the nature of the vulnerable population, a full board review from the IRB was required.³⁹ Our team used informed consent to ensure the interviewee's privacy. We recorded our consent prompt over audio, asking for the participant's permission. Our team faced several ethical considerations, such as cultural sensitivities, internal and external power dynamics, and privacy. First, some of the refugees are Muslim. Islam has exact rules on how men and women are allowed to interact. Our team only paired women with women and men with men to avoid religious sensitivities. Next, internal power dynamics exist inside refugee camps, just as outside camps. Our team considered an individual's marital and familial status, age, and gender when conducting interviews. Third, the most obvious external power dynamic was bridging the trust gap between refugees and interviewers. Finally, we believe that refugees have the right to privacy. Our team allowed interviewers to anonymize their identity to ensure the participant's safety. Transparency was prioritized to promote privacy.⁴⁰ We also disclosed the purpose of our interviews and our intended audience. Our team aimed to support well-being by promoting the ethical principle of beneficence.

Analysis

After conducting our 200 interviews and focus groups across four Somali refugee camps, several themes emerged across all interviewees, including community, providing for yourself and others, participation in recreational activities, vocational programs, and future. We have categorized them below and highlighted the key ideas throughout. We have further coded these responses to fit within the PERMA model of well-being. To identify each section of the model, we will type the category's letter next to the presented idea: (P) for positive emotions, (E) for Engagement, (R) for Relationships, (M) for Meaning, and (A) for Accomplishment. Ultimately,

³⁹ Ibid. Ch.4

⁴⁰ Ibid, Ch.4

the findings suggest that implementing these proposed programs would substantially enhance the well-being of refugees both during their stay in camps and in the future. Furthermore, the acquired skills could empower refugees to play a role in addressing climate challenges in Somalia should they decide to return.

Sense of Community and Belonging

One of the main themes across all of our interviews was the sense of belonging and the importance of community, which was presented in many different ways. First, many different community activities and groups are available to refugees within the camp. For example, many participants discussed participating in a women's empowerment group in their camp. They described this program as something that contributes to their sense of belonging because they have a group of people with whom they can connect and share about their daily lives or struggles. As participant Jamilah (18) explained: "I feel a solid connection to the community in the camp, and there's a mutual support system." Participants mentioned that they strongly desire to build their community through different organizations and activities, ultimately contributing to their well-being and those in the camp. Programs were described as meeting the immediate needs for connection and long-term goals of building a stronger, resilient community. Religious groups and their support in community building were also a common theme. This socialization with people who share similar beliefs made participants feel that this community was now making them feel more at home; they had emotional support, solidarity, and an overall sense of belonging within their refugee community. Participants in the focus groups also reported this. Nasra (40) highlighted religious and cultural events as one activity that makes her feel closest to her community as they allow refugees to gather for mutual support and celebration. Building their community and sense of belonging improved their relationship with their community and family (R) by being a part of something bigger than themselves (M). These ultimately lead to greater feelings of safety, happiness, and comfort (P). The recommended programs would contribute to the sense of community because they provide a space for people to work together and establish connections. We found that a sense of community contributes to positive emotions, relationships, and meaning.

Self-sufficiency and Providing for Others

Another recurring theme was the participant's desire to provide for themselves and their loved ones. Many fled Somalia with their families and explained how caring for and providing for their well-being gave them a sense of purpose. While the ongoing conflict has caused issues for many, the ultimate decision to leave for our participants was due to drought. They witnessed the destruction of their livelihoods and, therefore, strongly desire to provide and reclaim their abilities to care for themselves and those close to them. For example, participant Xirsi (30) explained how being able to provide for her family gave her meaning. She stated: "One of the moments that made me feel accomplished was successfully growing a small vegetable garden within the limited space available near our shelter. It wasn't much, but being able to cultivate

some fresh produce for my family gave me a sense of self-sufficiency and connection to our agricultural roots.” This is important because resources provided in the camps were scarce. Thus, many participants focused on the immediate needs of their families and tried to feel self-sufficient, as seen with Xirsi. Most times, the resources are just given to them in the camps, so it came up frequently that this self-sufficiency that participants once had no longer feels the same. However, participants who fled alone also expressed this feeling of wanting to provide for others and have enjoyed contributing to the needs of the camp, such as assisting with childcare. Overall, by providing for their families, they ensure the well-being of those around them (R), giving them a purpose and goal to meet their needs (M). Participants explained that providing those needs and having self-sufficiency make them feel accomplished and bring them joy (P) (A). These themes were also echoed by participants in the focus groups, who broadly reported that they longed for self-sufficiency and the ability to contribute meaningfully to their communities through their previous occupations. The recommended programs would reestablish participants' self-sufficiency and give them opportunities to provide for others. This fits positive emotions, relationships, meaning, and accomplishment within the PERMA model.

Participation in Recreational Activities

Participants mentioned the importance of participating in activities as it gives them something to do and look forward to. Existing activities were diverse but often needed to be improved. Activities included participating in religious ceremonies or events, sports, educational or training programs, women's empowerment workshops, camp celebrations, and community gatherings. Participant Mohamed (20) plays in the camp soccer leagues and explained how this contributed to his well-being. He stated: “One of the best memories has to be when our camp soccer team won the tournament. It was more than just a victory; it was a real boost for the team and a personal achievement. The celebrations were something else- pure joy and a break from the routine. Winning the tournament is a moment I'll always cherish in the midst of camp life.” Participants explained that they experienced feelings of happiness and joy, stress relief, and relaxation from the activities either put on by the community or provided by the camp (P). Being able to participate in an activity outside of their daily routine allowed refugees to be fully immersed and engaged (E). Participating in activities ensured that refugees did not feel idle or bored, and unengaged. Interviewees indicated a desire for more activity opportunities, especially those related to learning new skills. Activities such as educational programs can “meet immediate needs for connection and long-term goals of building stronger resilient communities.” As mentioned, community was important to refugees, and participating in communal activities was identified as a way for refugees to connect with others and find a sense of community (M). Ultimately, with the implementation of the recommended programs, more activities and ways to participate would be more available to refugees. This theme fits into positive emotions, engagement, and meaning within the PERMA model.

Participation in Existing Programs

Participants indicated that some educational or vocational programs did exist in camps, but most deemed them insufficient or ineffective in a few ways. Participants identified these programs as a way to gain skills to rebuild and support their families in the future. While some participants participated in educational or vocational training programs, such as tailoring, agricultural and sustainable farming techniques, literacy training, and basic computer skills, many noted the availability of these programs was limited or did not appeal to refugees' personal or career interests. One interviewee stated, "More tailored programs to develop skills or learn new languages would be beneficial for those of us hoping to rebuild our lives beyond the camp." Other barriers mentioned by several participants included lack of essential resources and caring for family or children, both of which were immediate needs that took priority over other activities. For refugees who did participate in these programs, participants stated they appreciated the skills they learned in the camp and that education made them feel accomplished (A). Additionally, participants shared feelings of "pride" (P) and "purpose" (M) through developing self-sufficiency and supporting and providing for their families. Vocational training programs not only improve well-being in the future but as with recreational activities, vocational and educational programs give refugees something to do (E) and facilitate collaboration and community within the camps (R). Participants in the focus groups also emphasized an eagerness for more vocational training programs, expressing an interest in those that help them earn usable qualifications or certificates that could aid them in their futures. These existing programs contribute to the positive emotions, engagement, relationships, meaning, and accomplishments for refugees within the PERMA model.

Thoughts About the Future

When asked about the future, participants expressed various emotions and expectations. Most commonly, "uncertainty" was a word many use regarding how they currently feel about their future. Many refugees did have a desire and hope to one day return to Somalia and help their futures and communities. Still, most were not confident that they would ever leave the camp, or if they did, that they would be able to return to and thrive in Somalia. Along with climate concerns, conflict was often identified as a barrier to returning. As the refugees continue to spend significant time in the camp, they note that the lack of opportunities and resources is disheartening and negatively impacts their sense of purpose. As participant Abdullahi (35) explains: "The challenges and uncertainties in the camp can be disheartening, and the prolonged displacement has created a sense of instability." Upon their return, they want to actively participate in a climate-resilient future and continue to develop their personal growth for a better future in Somalia. Through their engagement in personal development and working to build a better environment in Somalia, they find happiness and a purpose in their daily lives within the camp (P)(E)(M). Participating in the camp activities and vocational training programs gives them skills to find their self-sufficiency after returning home, providing for their families, and rebuilding their communities are important to them when thinking about the future upon their

return to Somalia. This theme also emerged among participants in the focus groups, with many expressing a desire to contribute to positive change despite the many challenges Somalia faces. Overall, being hopeful for the future through reskilling from the recommended programs contributes to positive emotions, engagement, and meaning in the lives of refugees.

Refugee Interest in Climate Vocational Training

The responses our team received during the execution of our focus groups indicate a strong enthusiasm amongst Somali refugees in both Kenyan and Ethiopian camps to engage in training programs designed to curtail the negative effects of climate change (P, E). Focus Group participants came from a variety of professional backgrounds and levels of education. Still, they were keen to convey the transferability of their respective skills from their prior employment in Somalia to support various aspects of such an initiative (E, A). Each recognized the significant consequences of climate change in the continuation of their displacement and recognized the importance of being equipped with skills to mitigate its effects (P, M). Our participants have a common desire to contribute (E, M). For example, a participant from the Dagahaley camp conveyed the value of her former experience as a teacher to emphasize the importance of “incorporating lessons on environmental awareness, conservation, and perhaps even organizing community initiatives related to environmental education”⁴¹. Similarly, another participant described the possibility of leveraging his prior interests and experience in computer science to “focus on technology and innovation with an environmental lens. Exploring sustainable technology practices, renewable energy solutions, and perhaps incorporating projects that address environmental challenges through technology would be exciting.”⁴² A range of training program possibilities were expressed by our participants, including those designed to teach skills surrounding sustainable agriculture, water conservation/purification, infrastructure weatherization, waste management, recycling, reforestation, disaster preparedness, renewable energy sources, the creation of community gardens, and the utilization of eco-friendly materials in their textile manufacturing.

Barriers to Program Participation

The most prevalent barrier to participation cited by our participants was the unavoidable continuation of their daily responsibilities - particularly childcare. Further impediments discussed included the need to fulfill other household duties, the issuance of necessary materials, the opportunity cost of forgoing other income-generating activities in the camp, transportation to and from the training facility, and a general lack of information dissemination regarding what programs will be offered. Camp administrators and refugees have divergent views on refugee well-being, with administrators focusing on performance and material metrics, overlooking the holistic assessment provided by the PERMA framework. While current success measures need not be discarded entirely, administrators should expand their understanding of well-being to

⁴¹ Appendix E

⁴² Appendix E

include intangible aspects, such as considering how a lack of basic items affects refugees' sense of self-sufficiency and agency, enabling them to identify alternative approaches for improving well-being in resource-constrained settings.

Refugee Requests for Program Design

Our research participants identified several core elements as essential to maximizing participation and the long-term effectiveness of any such training programs in the future. Notably, one heavily emphasized criterion was the prioritization of training objectives relevant to addressing real-world climate change challenges that they currently face in the camps and those they will engage with upon their return to Somalia (M). Several participants conveyed the importance of the hands-on application of lessons through community-based projects to foster a sense of engagement with and contribution to their respective camps (R). Providing purely classroom instruction, therefore, is considered to be inadequate. Furthermore, participants underscored the importance of maintaining contact with their trainers following completion by establishing a mentorship program whereby they can continue to share best practices (R). Importantly, participants identified the staffing of qualified instructors who could, upon completion, provide formal training certifications as invaluable to their sense of accomplishment and their potential to become self-sufficient in their future work by possessing evidence of their competence (P, E, A). The enthusiasm for participating in any such program is shared amongst Somali refugees with diverse educational and professional backgrounds.

Discussion

We did not expect the theme of community to be so prevalent among interviewees and focus group participants. Establishing and maintaining a sense of community was the most prevalent value expressed by the Somali refugees in the camps. This sense of community contributes to the refugees' well-being in many ways, as outlined by the PERMA model, including by connecting with others and developing strong relationships within the community (R), by promoting positive emotions through finding support within the community, but also by sharing moments of happiness and joy (P), and by allowing refugees to help others and contribute to the well-being of their community, fostering a sense of contributing to something greater than oneself (M). Because community was not only directly identified by the refugees as important but also contributed to several aspects of well-being according to the PERMA model, vocational training programs that offer a sense of community would improve refugees' well-being. The inherent nature of educational programs often facilitates a sense of community due to the group-setting of courses. Still, a program that prioritizes this, especially through community-based projects, could greatly enhance the well-being of program participants.

Expectedly, participants in both the interviews and focus groups indicated a strong interest in learning new skills and participating in educational and vocational training programs. Most refugees specified a particular interest in learning skills that they find personally interesting and/or would improve their future opportunities. Vocational training programs that aim to equip

refugees with desired and useful skills would not only improve the opportunities for employment and self-sufficiency but also immediately improve the well-being of refugees within the camp. Participants stated that they appreciated participating in activities and having something to do beyond the limited daily routine within the camp (E). Additionally, learning new skills and completing a program promotes a sense of accomplishment (A). The shared goals of many refugees were to provide for their families, improve their lives and regain their self-sufficiency. A vocational training program that offers these practical skills helps refugees immediately or eventually reach these goals (A). However, the barriers to participation mentioned by participants, especially the lack of childcare for mothers or parents and insufficient essential resources that take priority, could inhibit the participation of many refugees despite their interest. These barriers need to be considered and addressed when implementing vocational training programs.

We initially were uncertain whether Somali refugees would be interested in returning to Somalia and/or contributing to climate mitigation or adaptation of Somalia or whether refugees preferred to resettle in another country simply. Participants of both interviews and focus groups did express a desire to one day return to Somalia but indicated uncertainty regarding if or when they would ever return. This uncertainty comes from both the climate and conflict situation in Somalia. Despite this uncertainty, many refugees would like to one day return and help their country and families. For those whose livelihoods were directly impacted by the climate crisis, such as those working in agriculture, the desire to learn the skills necessary to improve or adapt to the climate situation was extreme. Vocational training programs that help refugees not only learn the skills for employment but also help their country or communities by contributing to improving the climate situation could improve refugees' well-being in several ways. First, while unable to completely eradicate uncertainty, these programs could reduce it and increase emotions like hope and optimism (P). Also, the ability to help others and contribute to the greater good, both within the camp during the training programs and in the future, if they ever return to Somalia or resettle elsewhere, improves their well-being (M). Participating in these vocational training groups would not only give them the skills they need for self-sufficiency but also contribute to climate mitigation and resilience and broadly help others in the camp and Somalia.

Implications

Our research aimed to explore whether implementing climate development training in refugee camps in Kenya and Ethiopia could improve the short and long-term well-being of Somali climate refugees per the metrics provided by the PERMA model. Our research found that Somali refugees are interested in climate-specific vocational training in refugee camps. Results also indicate that these proposed programs would significantly improve the well-being of refugees while in camps and the future and that refugees could use the skills learned to contribute to mitigating climate problems in Somalia if they are ever to return. Developing countries bear a disproportionate share of the adverse impacts of climate change. Acknowledging this, we argue it

is important to discover and amplify the perspectives of those victimized by these conditions and include them in climate mitigation solutions.

Previous research on solutions for climate mitigation and resilience has lacked sufficient and effective inclusion of localized perspectives in formulating international and national policy discussions. Even though research has shown that a failure to include local populations limits the impact of adaptation initiatives,⁴³ top-down directives persist. Therefore, our research, which directly involves the perspectives, opinions, and ideas of those most impacted by the Somali climate crisis, assists in remedying this gap. Experts agree that refugee camps often lack sufficient social support and programs in addition to essential resources, which have been found to impact refugees' well-being. Camp administrators prioritize performance and material metrics, neglecting the holistic well-being assessment offered by the PERMA framework. While retaining some success measures, administrators should broaden their understanding of well-being. Ultimately, our research has shown that refugees are interested in participating in climate-oriented vocational training programs and that these programs would likely improve refugees' well-being by promoting each PERMA characteristic.

Program Recommendations

Climate-oriented vocational training programs have been deemed both desired by refugees and able to contribute to the short and long-term well-being of refugees based on the results of data analysis. Based on our findings, we have several recommendations for policymakers and camp administrators for implementing these programs. First, while essential resources are often insufficient in refugee camps, educational and vocational programs and activities should not be overlooked. These activities can improve short- and long-term well-being and are appreciated by refugees in camps. Also, because interests and skill sets differ among refugees, between camps, and among camps, there will not be a "one-size-fits-all" program, and would need to consider what is feasible with the available resources and what would be most effective in meeting refugees' needs. Programs should aim to be community-oriented and project-based, where the skills learned could be applicable or transferrable in various settings, including within the camp, outside the camp in the host country, and in Somalia if they can ever return. Refugees expressed a desire not only to have skills for future employability but also to contribute to bettering their community, whether the camp community or the Somali community. Strategic or flexible scheduling should be utilized, and consideration of women with children should be prioritized. Some level of childcare needs to be offered or organized to ensure all interested have a fair opportunity to participate in these programs. Lastly, camp administrators should provide an unofficial or official certification after completing the program. An official certification would give refugees an advantage when job searching, but if not possible, an unofficial certification would still promote pride and accomplishment among participants. Although we determined that these programs would improve well-being, more research should

⁴³ Al-Zu'bi, M. Jordan's climate change governance framework: from silos to an intersectoral approach. *Environ Syst Decis* 36, 277–301 (2016). <https://doi.org/10.1007/s10669-016-9602-9>

be done to understand more completely what kinds of climate vocational training would be most preferred, beneficial, and feasible within refugee camps.

Limitations

Our team identified several possible limitations in our data collection and interpretation process for our research question. While this list is not exhaustive, it highlights the most significant constraints that future research should focus on overcoming. These constraints included the size and scope of our research, which examined only four total Somali refugee camps in two countries. There may have been potential differences in the perception of climate change causes and effects between our team and Somali climate refugees,⁴⁴ which may impact the quality of data regarding their well-being. Furthermore, our choice of long-established refugee camps may have resulted. Although we had initially intended to conduct an ethnography, camp conditions and limited resources made this unfeasible. Additionally, restrictions on freedom of movement within some camps, like Dadaab in Kenya, would have hindered participation and the collection of accurate responses due to potential fear of reprisal. Lastly, the potential disparity in understanding well-being assessment models between the research team and camp staff could skew the interpretation of refugee well-being. The identified limitations emphasize the need for careful consideration and adaptation in future research endeavors. Future research could resolve some of these limitations, especially the concern of size and scope. This project should be considered exploratory and insufficient to concretely determine the design and effectiveness of climate vocational training programs in refugee camps.

Reflection

Charged with the task of orienting our research towards the study of climate change, our team sought to identify a more granular topic that resonated with our respective areas of interest within LBJ. The decision to focus our efforts on Somalian climate refugees residing abroad, therefore, enabled us to express our particular interests in International Development and Security while simultaneously affording us a natural opportunity to satisfy the goals of qualitative research identified earlier in the course - to include giving voice to marginalized groups and interpreting culturally or historically significant phenomena.⁴⁵ The displacement of Somalis due to political instability, the perpetuation of violent conflict, and the consequential inability of Somalis to meet their basic needs within their home country have persisted for more than three decades. The intractable nature of violence has, over generations, contributed to the normalization of the plight of the Somali people to the rest of the international community - leaving policymakers and firms alike to dismiss the future of Somalia due to its status as a 'failed state' not worthy of investment. However, such a normalization not only serves to perpetuate inaction by other states, international institutions, and NGOs but also distracts from the equally

⁴⁴ Hesse-Biber, Sharlene Nagy, ed. *Feminist research practice: A primer*. Sage Publications, 2013. Ch.4

⁴⁵ Ragin, C. C., & Amoroso, L. M. (2011). *Using Qualitative Methods to Study Commonalities*. *Constructing Social Research: The Unity and Diversity of Method* (pp. 135–162). Pine Forge Press

devastating factor that contributes to mass displacement and emigration - perennial droughts and subsequent flooding stemming from climate change that ruins arable land, destroys shelters, and decimates livestock.

Establishing a structured framework for interpreting the results of our interview and focus group questions proved to be the most time-intensive and challenging task despite the ease with which our team could identify commonalities within the responses provided. However, our use of the PERMA model of well-being provided a framework through which we could objectively associate the trends identified from interview/focus group responses with determinations of refugees' current well-being and their perceptions of how it can be improved in the future. While demanding, the coding process streamlined our operationalization of 'well-being' through the use of the PERMA model - thereby allowing our team to advance beyond traditional definitions of 'success' that are employed by NGOs involved in controlling both the refugee and climate crises. Ultimately, our interview and focus group responses provided sufficient data to answer our core research question and provided several insights into the constraints that face the implementation of any such 'green' vocational training. The findings we derived from our interviews and focus groups that we least expected included the potency of a sense of community across refugees in different camps and the barriers to participation in vocational training that are presented by everyday tasks - especially childcare. Our surprise at these themes was partially based on an errant assumption that Somali refugees within these camps would tend to retreat within themselves due to their past traumatic experiences and that idle time within refugee camps would be maximal. In fact, we found that the shared burden of fleeing from one's home acted as a unifying factor and that our participants tried to preoccupy themselves with daily responsibilities, recreational tasks, and participation in religious activities to provide a sense of stability to their lives in camps. However, one problem presented in interpreting our results is that despite our efforts to prompt ChatGPT with the unique attributes of camp facilities and individualized refugee profiles, there was extensive uniformity across the answers we received from interview participants. This phenomenon is likely indicative of the behavior designed into the backend of the A.I. model as opposed to the variations in thoroughness or thoughtfulness we could expect from different human participants posed with the same interview questions and prone to true emotions of fatigue, malnourishment, and lack of agency that refugees are likely to experience.

Appendix A: Interview Protocol, Participants, and Questions - Conducted Using Chat GPT

Before the interviews, our team, with the assistance of translators, will inform willing interviewees about the sensitive nature of the topics to be discussed. Interviewee will also have the option to anonymize their identities before the interview begins. Informed consent will be documented on the same audio file as the interview, outlining the purpose of our research and the use of the participant's responses.

During interviews, we will conduct one-on-one sessions to ensure free and candid responses without the influence of relatives or other refugees and the potential negative social dynamics they may bring. We will select suitable, interference-minimized locations within each camp to conduct our interviews.

(Interviews were conducted using ChatGPT. We created four bios of refugees and gave this plus camp information to ChatGPT in our prompt. We then fed ChatGPT one question at a time, diverging as necessary like a real review).

Interview Questions focused on experiences/well-being within camps:

1. What region/area of Somalia were you displaced from?
2. How did you travel from there to this camp?
3. How long have you been residing at this camp?
4. Is this the only camp that you have lived at since leaving Somalia?
5. Why did you leave Somalia?
6. Did you decide to leave immediately? If not, what made you finally decide?
7. Who did you arrive at this camp with?
8. Are any of your friends/family still living in Somalia?
9. How did you provide for yourself and your family while living in Somalia? Was this adequate for your needs?
10. Do you feel that your basic needs, including food, adequate shelter, and healthcare, have been met?
11. How has having (not having) access to these resources impacted your day-to-day life?
12. How long has it been since you could use those skills to provide for yourself/your family?
13. Have you been provided enough of what you need since arriving at this camp?
 - How have you usually spent your time each day since you arrived at this camp?
 - Are you better or worse off since you arrived at this camp? Why?
 - What resources, training, or information have the camp administrators provided to you to help you leave this camp and sustain yourself?
14. What educational programs are available to adults in the camp?
 - Have you participated in any of these programs?
 - What have you learned, and how has this made you feel?
15. Are there any paid or unpaid employment opportunities?
 - Have you been able to work formally or informally?
 - How has having work to do impacted your life in the camp?
16. Have you contributed to camp functions or helped others in the camp?
 - Why have you decided to get involved in this way?

17. Did you continue your education after arriving at the camp?
 - If not, then what occupational training programs were available to you?
 - Have you participated in these programs? Why or why not?
 - How has this impacted your experience in the camp?
 - What is something that you've experienced that has made you feel accomplished?
18. What education is available for children?
19. Is there any childcare, official or unofficial, for children?
 - How has having (or not having) childcare impacted your life?
20. What religious activities have you been involved in in the camp?
 - How has being in this camp impacted your ability to practice your religion?
 - How has being able or not able to engage with your religion impacted your life?
21. How connected do you feel to the community in the camp?
 - Do you feel supported by those around you?
 - Are there programs for you to become involved in with other community members?
 - Are they recreational or aimed at improving the community?
22. What is your happiest memory since being in the camp?
 - Do you have any negative memories from your time in the camp?
 - How did that make you feel?
23. Do you feel that camp workers or administrators have overlooked any aspects of your experience?
24. Are you better or worse off since you arrived at this camp? Why?
25. Has being in the camp impacted the way you see your purpose or has it changed your life goals?
 - Has moving to the camp made you more or less hopeful for your future?

Appendix B: Sample Interview Transcript - Abdullahi (ChatGPT)

- [Abdullahi Interview Full-Transcript](#)

Interviewer - Start

Hello Abdullahi, my name is JP and I am a researcher with the University of Texas at Austin. We are looking into what technical training programs are offered in refugee camps. We would like to interview you to understand your experience in these camps. We will record this interview, but we will protect your privacy and anonymity. If you consent, you are able to withdraw your consent at any time or not answer any questions that you do not feel comfortable with. Do you consent to this interview?

Abdullahi

Hello JP, thank you for explaining the purpose of the interview. I understand and consent to participate. You have my permission to record the interview.

Interviewer

Hello Abdullahi. What region/area of Somalia were you displaced from?

Abdullahi

Hello JP. My brother and I were displaced from the Hiinlabi region in Somalia due to flooding. We used to work in the salt mines there before we had to leave.

Interviewer

My next question is: when you were displaced from the Hiinlabi region, how did you travel from there to the Kebribeyah refugee camp?

Abdullahi

After we were displaced from Hiinlabi, my brother and I faced a challenging journey. We initially traveled by foot, making our way to the nearest town. From there, we relied on various modes of public transportation, such as buses and shared taxis, to reach the border with Ethiopia. Once

Appendix C: Sample Interview Coding - Xirsi

Community Self-sufficiency/helping others Activities	Vocational/educational programs Future
2nd Round Codes - PERMA codes	1st Round Codes- Themes (Olivia - Xirsi)
<p>A, M P, R M, A P R</p> <p>A, M A</p> <p>A, M A R R, P E R</p> <p>A A, E A, E, M P</p> <p>A, M A M A</p> <p>R A A, M E E, M, R A, E R, E M, R, A</p>	<p>3. Hope to return and rebuild 4. Desire stability and support 5. Drought made livelihood impossible Sought stability and security 7. Hope conditions improve to reunite with loved ones in Somalia 8. Drought destroyed livelihood, unable to provide for family 9. Limited essential resources, old agriculture skills no longer applicable Rely on camp support, no longer self-sufficient 10. Limited educational opportunities Connected with other women Share experiences and support Attend workshops women's empowerment and health Try to maintain sense of community 11. Food resources ok, shelter not sufficient, overcrowded health 12. Poor resources daily struggle Camp different from self-sufficiency 13. Some workshops and training sessions Limited training aimed at skills to leave camp Can't envision way out without more support "There hasn't been much in terms of specific resources or training to help us leave the camp and sustain ourselves in the long term. It's challenging to envision a way out without more targeted support and opportunities." 14. Adult education and literacy but difficult to attend because busy taking care of family Want programs to develop skills and language for future life outside of the camp "Many of us are focused on immediate needs and taking care of our families." "More tailored programs to develop skills or learn new languages would be beneficial for those of us hoping to rebuild our lives beyond the camp." 15. Hard to participate when taking care of family 16. Education made feel accomplished Want skills to improve life 17. Limited camp employment Informal activities and contributing to community 18. Some informal activities, but not same as self sufficiency 19. Community gatherings She contributes to community by helping childcare</p>

Appendix D: Focus Group Protocol and Questions - Conducted Using Chat GPT

(Procedure similar to interviews with ChatGPT, but this time we asked ChatGPT to act as a focus group of 4 participants. Questions were again fed one at a time. We conducted 2 of these and coded same as interviews)

Focus Group Questions

1. Do you want to return to Somalia?
2. How do you feel about Somalia's future, and what is your role in the fate of Somalia?
What do you believe is necessary for Somalia to have a better future?
3. If conditions were to improve in your region of Somalia, what would adequately prepare you to return to your old life there?
4. Would you be interested in participating in vocational or occupational training?
5. Would you be interested in contributing to improving Somalia's environmental situation?
6. Are you interested in training opportunities that would prepare you to improve Somalia's position to withstand the adverse effects of climate change?
7. In the development of these training opportunities, what would you expect from the staff members and NGOs? What would make you feel most supported and empowered in these programs?
8. Would earning real-world, usable certificates through program involvement help you transition to life outside of the camp?
9. What kinds of activities give you the most tremendous sense of community?
10. What was your occupation back in Somalia?
11. What skills would you like to develop further or learn?
12. What are some environmental improvements you would like to see within the camp?
13. What barriers do you face that make it hard to participate in educational/training programs?
14. If implemented in your camp, how would these vocational programs and training impact how these skills and training make you feel?
15. What makes you feel accomplished?
16. What types of community project ideas do you have that you and other community members would enjoy?
17. We are planning on designing a vocational training program that prioritizes environmental sustainability. Would you be interested in participating in a program of this design? Is there anything you want us to know or consider when designing these programs to meet your needs best?

Appendix E: Participant Biographies

Jamilah (18-year-old girl): She has been living in the camp for six years. Her parents died before she came into the camp, and she has been taking care of her three siblings since they died. She was in school until their family had to flee Somalia. Currently, she is living in the **Dagahaley camp in Kenya**. Has one daughter and is single.⁴⁶



Xirsi (30-year-old woman): She has been living in the **Ifo camp in Kenya** for seven years with her husband and children, and is currently pregnant. Xirsi has never had an official job, but together with her husband, she maintained their village farm. They mainly grew cassava and other vegetables and maintained livestock. Their livelihoods were destroyed because of the drought, and they have been living in the camps for five years after they were eventually displaced. - small village.



Abdullahi (35-year-old man): He has been living in the camp for eight years. Previously, he worked in the Hiinlabi salt mines with his brother, but have both been displaced. They both went to school for a few years before being pulled to begin working. They currently live in **Kebribeyah Camp in Ethiopia**.



Mohamed (20-year-old boy): Has been living in **Aw-barre, Ethiopia**, for seven years. Before arriving at Aw-barre where he stayed for 10 years to the Kebri Before moving, he worked as a food cart vendor in Mogadishu, the capital of Somalia. He loves to play and watch soccer. His family stayed in Somalia, but he was looking for opportunities to earn money to send back to his family.



⁴⁶ All photos were created using AI based on the descriptions we presented

Noor (27-year-old female): Lebanese refugee camp worker with two years of previous work experience in the **Ain-Al-Hilweh** refugee camp for the International Committee of the Red Cross, which houses over 100 thousand Syrian and Palestinian refugees in Southern Lebanon.



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