



OWNING OUR FUTURES:
APPROACHES TO REALIZE COMMUNITY ACTION
FOR CLIMATE CHANGE ADAPTATION
IN UGANDA

A CONSENSUS STUDY OF
THE UGANDA NATIONAL ACADEMY OF SCIENCES



Sciences for Prosperity

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The Uganda National Academy of Sciences (UNAS) is an independent, non-political, and non-profit organization founded in October 2000 to provide evidence-informed policy advice to the government and nation of Uganda.

Owning our Futures: Approaches to Realize Community Action for Climate Change Adaptation in Uganda

Published by The Uganda National Academy of Sciences

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ISBN: 978-9913-625-02-9

EAN: 9789913625029

Suggested Citation: Uganda National Academy of Sciences. 2023. *Owning our Futures: Approaches to Realize Community Action for Climate Change Adaptation in Uganda*. Report of the Committee on Community Action for Climate Change Adaptation. Kampala Uganda.

ACKNOWLEDGEMENTS

The Uganda National Academy of Sciences (UNAS) would like to take this opportunity to recognize the immense contributions from across Uganda and the globe in making this study possible. First, we would like to acknowledge the William and Flora Hewlett Foundation, which has generously provided the funding to make this work possible. Second, we would like to express our sincere thanks to the UNAS Council, which has continued to provide steady and consistent leadership that allows UNAS to operate with confidence and dynamism. Lastly, we would like to thank the members of the Committee on Community Action for Climate Change Adaptation, who undertook this consensus study, shared their expertise, and ultimately took ownership of this report's message.

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PREFACE

The Uganda National Academy of Sciences' (UNAS's) focus on mindset shifts for country ownership of national development agendas has progressed since its initial report in 2014. The Academy's series of consensus study reports—covering country ownership, urbanization, education, health, domestic financing, building trust in national governance and partnership systems, and reimagining being and belonging in Uganda—articulates a vision for Uganda's development. The reports also provide evidence-informed actionable recommendations to business, government, civil society, and international development stakeholders to achieve that vision. The series offers unbiased recommendations to enable a progressive shift in how national development issues are presented, deliberated, prioritized, and addressed by going beyond intellectual articulation and the flair of politicized debate.

UNAS defines a *national development agenda* as a vision of shared economic prosperity, environmental health, and social wellbeing, achieved by creating an enabling framework that empowers and builds the capacity of individuals, communities, and institutions to pursue the agenda's priorities and goals. National development, then, concerns itself with poverty eradication and the empowerment of citizens to seize opportunities for prosperity and increase their freedom (Sen, 2001; UNAS, 2014). Unlike the United Nation's Sustainable Development Goals, the national development agenda of UNAS aims to protect the country and its people by focusing on climate change, lessening poverty, and improving the lives of all who inhabit Uganda through an equitable approach. According to the Academy's consensus study on country ownership (UNAS, 2014), a fully owned national development agenda addresses the needs of every citizen and requires personal responsibility, confidence among citizens, and a sense of every citizen having a personal stake in achieving the agenda.

Country ownership is defined as leadership and participation, at all levels and in every sector of society, toward achieving a unified goal,

where individuals have a stake in and a shared responsibility for delivering the common development agenda. It relies on cultivating a long-term, developmental mindset at all levels of society. The continent's political leaders are responsible for facilitating an enabling environment where this developmental mindset can grow from the roots of community resilience (Nkurayija, 2020; UNAS, 2021). At an event hosted by the Center for Global Development in 2010, Dr. Freddie Ssenooba, associate professor of health economics and health systems management at Makerere University, advocated for a shift to country-owned responses to promote better health outcomes and sustainability, stating that country "ownership comes when success is hard to sustain!" (Center for Global Development, 2010).

The Academy's report on governance and partnership systems (UNAS, 2021) highlighted the intrinsic value of trust in charting a development path, formulating strategies, and implementing policies genuinely and inclusively. One pervasive idea emerges from analyzing the Academy's consensus reports: communities must be the focus of any development agenda. Involvement in planning, implementing, and assessing development priorities transforms these communities from beneficiaries of development programs to active agents in their development. The Academy focused this study on community ownership for climate change adaptation, which complements its existing body of work as it fulfills its mandate to provide unbiased, apolitical, evidence-informed advice to the nation.

DEFINITIONS BASED ON IPCC AND UNAS REPORTS

Adaptation: The process of adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities

Biodiversity: The variability among living organisms from all sources, including, among other things, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.

Biomass: Fuels derived from organic materials, such as timber, livestock waste products, or plant materials.

Circular Economy: Promoting the revalorization of waste products to be recycled into the supply chain to promote sustainable waste management systems and local livelihoods.

Climate Change: Change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for a long period, typically decades or longer.

Climate-Smart Agriculture: Introducing techniques and technologies that improve production and climate resilience while reducing greenhouse gas emissions associated with traditional agricultural practices.

Climate: The statistical description of the mean and variability of relevant quantities over a period ranging from months to thousands or millions of years.

Communities: The traditional support structures that make individuals resilient. Communities are often formed through family or clan associations. Professional guilds, solidarities, age-grade associations, and religious societies also form communities. Communities are the roots of an African identity.

Equity: Addressing the gaps that prevent people from having equal opportunities and outcomes in a group or population.

Greenhouse gases: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit radiation, trapping heat in the atmosphere and raising the earth's temperature.

Intergovernmental Panel on Climate Change: A body or institution formed jointly by the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) in 1989 to provide broad and balanced information about climate change.

Mitigation: The lessening of the potential adverse impacts of anthropogenic climate change by limiting or avoiding the input of heat-trapping greenhouse gases into the atmosphere

National Adaptation Programs of Action (NAPA): As defined in article 4.9 of the UNFCCC, and further provided for by Decision 5/CP.7 of the COP to the UNFCCC, provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change-those for which further delay would increase vulnerability and/or costs at a later stage.

Nationally Appropriate Mitigation Actions (NAMA): Refers to a set of policies and actions countries undertake to reduce GHG emissions. The term recognizes that different countries may take different nationally appropriate actions based on equity and in accordance with common but differentiated responsibilities and respective capabilities.

Regenerative Agriculture: Prioritizing natural ecosystem processes to restore soil quality and improve crop productivity and resilience without using manufactured products such as fertilizers or irrigation systems.

Resilience: The capacity of social, economic, and ecosystems to cope with a hazardous event or trend, or disturbance, responding, or reorganizing in ways that maintain their essential function, identity, and structure, as well as biodiversity in case of ecosystems, while also maintaining the capacity for adaptation, learning, and transformation.

Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Weather: Describes the conditions of the atmosphere at a certain place and time regarding temperature, pressure, humidity, wind, and other key meteorological elements; the presence of clouds, precipitation, and the occurrence of special phenomena such as thunderstorms, dust storms, tornados, and others.

QUOTES

When the snake is in the house, *one need not discuss the matter at length.* African Proverb

“You don’t have to fight climate change alone.”

– Ismael Tamale, Co-Founder of My Tree Initiative, Climate Change Activist (International Monetary Fund 2022)

“Climate change is more than statistics, it's more than data points. It's more than net-zero targets. It's about the people, it's about the people who are being impacted right now,”

– Vanessa Nakate, Climate Change Activist from Uganda (United Nations 2022)

“Many communities on the frontlines of the climate crisis are already experiencing loss and damage. Communities cannot adapt to extinction; communities cannot adapt to starvation. The climate crisis is pushing so many people in places where they cannot adapt anymore.”

– Vanessa Nakate, Climate Change Activist from Uganda (United Nations 2022)

“We look to the environment for the food and fuel, and the medicines and materials that our societies depend on. We look to it as a realm of beauty, and of spiritual sustenance. But let us not be deceived, when looking at a clear blue sky, into thinking that all is well. All is not well. Science tells us that if we do not take the right action now, climate change will bring havoc, even within our lifetime.”

– Kofi Annan, Statement at the World Summit on Sustainable Development, Johannesburg, 2 September 2002 (Kofi Annan Quote Library)

“Unless action is taken on climate change, sustainable development will not be achieved.”

– Kofi Annan, Article in Digital Development Debates, 2015
(Kofi Annan Quote Library)

“We are the first generation to feel the impacts of climate change and the last generation that can do something about it.”

– Barack Obama

“Climate change will test our intelligence, our compassion, and our will. But we are equal to that challenge.”

– Justin Trudeau

“Climate change if unchecked, is an urgent threat to health, food supplies, biodiversity, and livelihoods across the globe.”

– John F. Kerry

“The world is reaching the tipping point beyond which climate change may become irreversible. If this happens, we risk denying present and future generations the right to a healthy and sustainable planet- the whole of humanity stands to lose.”

– Kofi Annan, Former Secretary-General of UN

“Twenty-five years ago, people could be excused for not knowing much, or doing much, about climate change. Today we have no excuse.”

– Desmond Tutu, Former Archbishop of Cape Town

ACRONYMS

CBO	Community Based Organization
CCU	Climate Change Unit
CCMP	Climate Change Master Plan
CFU	Climate Finance Unit
CIF	Climate Investment Fund
CSR	Corporate Social Responsibility
CMP	Catchment Management Plan
EAC	East African Community
EACCCP	East African Community Climate Change Policy
ESG	Environmental, Social, and Corporate Governance
EACSAP	East African Climate Smart Agriculture Platform
IDDRSI	IGAD’s Drought Disaster Resilience and Sustainability Initiative
GHG	Greenhouse Gas Emissions
GoU	Government of Uganda
INDC	Intended Nationally Determined Contributions
HoRN	Horn of Africa Resilience Network
IAGD	Intergovernmental Authority on Development
IHACC	Indigenous Health Adaptation to Climate Change
IIED	Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
ISSD	Integrated Seed and Sector Development
LDCs	Least Developed Countries
MAP	Multi-Actor Partnership
MoFPED	Ministry of Finance Planning and Economic Development
MWE	Ministry of Water and Environment
NAADs	National Agriculture Advisory Services

NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programs of Action
NCCP	National Climate Change Policy
ND-GAIN	Notre Dame Global Adaptation Initiative
NDP	National Development Plan
RE	Renewable Energy
REDD	Reducing Emissions from Deforestation in Developing Countries
UNEP	United Nations Environment Program
UNAS	Uganda National Academy of Sciences
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations Children’s Emergency Fund
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WFP	World Food Programme
WMO	World Meteorological Organization
WWF	World Wide Fund

CONTEXT: THE ACADEMY AND ESTABLISHMENT OF THE COMMITTEE

The Uganda National Academy of Sciences (UNAS) believes in the agency of Ugandans within their communities to perceive, forecast, and execute contextually relevant actions to achieve their development goals. Indeed, for the last decade, UNAS has focused on communities as the foundation of its evidence-informed policymaking programs.

The Academy has intentionally convened diverse multidisciplinary expert committees to undertake consensus studies on the following representative sample of pressing societal issues: country ownership (2014), vaccines and immunization (2014-present), urbanization (2016-2018), domestic financing (2020), trustworthy development partnerships (2021), equity and inclusion (2022), and pandemic preparedness and control (2022). These expert committees have consistently paid close attention to making policy recommendations that place communities at the center of any development practice. With community buy-in and action, Uganda has an incredible opportunity to unleash its communities' creative wisdom and energies. The communities, provided with opportunities to actualize their potential, undergird sustainable national development.

The Academy consulted stakeholders in government, business, indigenous civil society organizations, and academia to discuss community action for climate change adaptation, which rose to the top of the cross-cutting challenges that eluded siloed solutions. It required an integrated approach to imagine a community-centric framework for climate change adaptation. As such, UNAS, Uganda's premier science advice organization, appointed a committee of experts to undertake a consensus study on community action for climate change adaptation. The Academy provides a neutral platform for experts from different sectors and disciplines to scrutinize credible knowledge and agree on

a bespoke set of evidence-informed recommendations for Uganda's policymakers. The committee had one overarching question: What practical measures can inform and inspire contextually appropriate climate action in Uganda? The following section explains how this question informed the committee's work.

PROBLEM STATEMENT: CLIMATE CHANGE AS AN OPPORTUNITY FOR COMMUNITY ACTION

The Government of Uganda (GoU) acknowledges the significant threat and opportunity climate change poses to Uganda (Uganda Vision 2040, Cap. 304). Recognizing that climate change affects Uganda's development agenda, all sectors, institutions, and communities, the GoU has developed the following laws, policies, and strategies:

1. National Climate Change Act of 2021
2. National Climate Change Policy of 2015
3. Uganda Green Growth Development Strategy 2017/18 – 2030/31
4. Nationally Determined Contributions (NDCs) of 2022
5. National Climate Change Communication Strategy of 2018

Beyond these high-level responses, Uganda already experiences the impacts of climate change. For example, seven droughts occurred between 1991-2000 in the arid Karamoja region of Northeastern Uganda. More droughts occurred in 2001, 2002, 2005, 2008, and 2011. Prolonged droughts have led to widespread crop failures, drying up of surface water sources, a hunger crisis, and death due to starvation in the Karamoja cattle corridor (Nakalembe, 2018; Nansamba et al., 2022). In Eastern Uganda, heavy rainfall and flooding have caused death, internal displacement, and eroded sources of livelihood (McKinney & Wright, 2021; The East African, 2022).

These examples demonstrate the results from the Climate Risk and Vulnerability Assessment (World Bank, 2021), which indicated that the average temperatures in Uganda had increased by 1.3°C since the 1960s. Over the last 20 years, Western, Northern, and Northeastern regions have experienced more frequent and longer-lasting drought conditions.

The projected percentage of rainfall from heavy precipitation events will increase, accentuating climate change risk through floods and landslides (Nsubuga & Rautenbach, 2018).

Moreover, climate change presents a unique opportunity for Uganda to reimagine how it responds to its persistent development challenges. Using climate change as a lens to formulate an inclusive and actionable response plan owned by Ugandan communities can transform our nation.

Despite the ongoing impacts of climate variability, Ugandan communities at different levels have yet to implement the GoU's adaptation and mitigation measures. Uganda lacks the funds to implement its climate change strategy fully but is yet to harness ongoing climate actions that require low or no cost for implementation. These parallel challenges indicate a lack of community ownership in responding to climate change as the root cause of the observed low uptake of these policies. Policies become meaningless without implementation. The opportunity for Uganda lies in elevating communities' collective and concerted efforts to address climate change. The committee centers the unexplored resources within our communities to unearth measures that can inform and inspire lasting climate action in our country.

COMMUNITY ACTION AND OWNERSHIP OF UGANDA'S CLIMATE AGENDA

There is little doubt that the climate crisis is becoming increasingly dire worldwide, with a disproportionate impact on regions that are geographically or socio-politically vulnerable to environmental and economic shocks. Although Africa has only contributed 2-3% of global emissions, it is disproportionately vulnerable to the harmful effects of climate change (UNEP, n.d.). Since 2022, five of Africa's top 30 deadliest weather disasters have occurred, including severe flooding, cyclones, and drought (Masters, 2023). In the past three years, extended droughts have been found to lead to food crises and have possibly contributed to excess deaths in countries such as Uganda, Madagascar, and Somalia. Waterborne diseases have run rampant because of tropical storms, floods and other natural disasters, and locust swarms have endangered the lives and livelihoods of individuals across East Africa. Uganda is currently ranked the 15th most vulnerable country and the 147th most prepared (Twecan et al., 2021), indicating the need to develop sustainable and resilient mitigation and adaptation strategies. Thus, the equity issues latent in globally-entrenched income disparities between countries must be addressed to promote sustainable economic growth and development worldwide.

Social and economic inequalities are prevalent between countries and within countries, as the most vulnerable and marginalized groups are exposed to the brunt of climate change (see Appendix A). In this context, care must be taken to not further reinforce these disparities and vulnerabilities by introducing climate solutions that are predicated on the assumption that lower-income countries need financial assistance and knowledge from higher-income ones (Sewankambo et al., 2023); this framing is damaging to the conceptualization of country ownership and the development of solutions that prioritize the unique needs of

individual countries rather than those who control the resources to finance these solutions. Promoting country ownership and country-driven strategies to combat climate change are thus essential within the context of the climate crisis to ensure that these inequities and power imbalances between the Global North and South are discontinued.

When discussing development rhetoric and country ownership, there is a need to emphasize the importance of in-country knowledge and skills. Emphasizing the power imbalances inherent in referring to ‘developed’ versus ‘developing’ countries automatically assumes these countries’ relative social, political, and economic stability. Such a system only perpetuates harmful biases and promotes the ‘white savior’ complex that can negatively affect development. Sewakambo et al. (2023) describe this inequitable and harmful system, describing how “redefining global health as a dignity-based practice has implications for what counts as legitimate knowledge. Inequities entrenched in various practices, such as funding structures and publishing practices, have tended to value outsiders’ expertise over proximate knowledge sources in global health.” By accepting this rhetoric and prioritizing external decision-making over internal knowledge reservoirs, development will always be unequal and favor the Global North.

Focusing on in-country ownership of climate change action plans articulated by local actors will promote the development of internally-driven policies and strategies. Participatory actions also utilize the lived experience of a community to promote strategies that are easily adaptable and tailored to individual contexts, which will ultimately be more sustainable and effective in the long-term. Climate action that has no basis in the strengths of Uganda’s communities will not yield lasting and locally owned climate action. Likewise, climate action based on the priorities, knowledge, and experiences of entities outside Uganda and Africa will not have a meaningful impact on Uganda (Lea Filho et al., 2021; Mbembe, 2017; United Nations et al., 2021).

Externally driven adaptation and climate action become irrelevant and wasteful when the committee considers the benefits of community-level action. Climate change financing is often touted as crucial to climate action (African Development Bank, 2023; United Nations et al., 2021). However, upon closer examination, financing is less

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visible in community-owned climate action (Lea Filho et al., 2020; Johansson and Abdi, 2019; Lea Filho et al., 2021; Mashi et al., 2020). Research conducted by the International Institute for Environment and Development (IIED) has found that less than 10% of the international funding allocated to supporting climate action in developing countries is targeted to local initiatives and that only 7% of climate finance is sufficiently transparent to enable accurate tracking from the source to its end use (IIED, 2019). This paucity in prioritizing locally driven solutions undermines efforts to increase country ownership, while lack of transparency and accountability affects the accurate assessment of programmatic impact. Thus, changes must be made at multiple levels, both nationally and internationally, in governance structures and climate financing mechanisms to ensure that countries are given sufficient resources to drive sustainable and functional climate solutions.

Lea Filho et al. (2021) showcase evidence of African communities implementing climate adaptation measures. The much-needed climate action has already started at sub-national and community levels. The report by the United Nations et al. (2021) demonstrates that African communities have implemented nature-based solutions to adapt to climate change. These community-owned actions cost much less than externally driven climate adaptation measures. The communities use locally available resources and prioritize stakeholders engagement in planning and implementing their actions (Filho et al., 2020), making their climate response and action cost-effective. In prioritizing non-monetary resources, the communities highlight their wisdom in action (Tume et al., 2019). In this way, communities take charge of authoring their futures in the face of a climate crisis based on their local realities (Death, 2021; Tume et al., 2019).

Uganda has taken several key steps towards promoting community ownership within the climate sphere by adopting key policies and implementing programs dedicated to continued climate action. More can be done regarding climate mitigation and resilience, including increasing community participation by integrating local and indigenous knowledge frameworks into existing action plans. A 2018 study investigating the interdisciplinary Indigenous Health Adaptation to Climate Change (IHACC) project and other community-based adaptations found that

increasing participatory action and incorporating indigenous groups into discussions on climate change had positive impacts on awareness raising, capacity building, and decision-making among indigenous individuals (Ford et al., 2018). Focusing on developing participative, community-driven adaptation plans that integrate local priorities and knowledge into local adaptation plans will ensure a more informed, tailored approach to these strategies and will promote effective linkages between national-level and community-level initiatives in Uganda (Wright et al., 2014).

Developing more policies and programs designed to support vulnerable populations from economic and climate shocks, especially in the agriculture and energy sector, and increasing climate finance mechanisms dedicated to reducing dependence on external sources of funding for mitigation strategies, will be essential to accomplishing this goal.

DRIVERS FOR COMMUNITY OWNERSHIP OF UGANDA'S CLIMATE ACTION

A key challenge for proponents of community ownership is how to motivate greater community participation in climate action. Uganda has already taken several steps to promote climate resilience, especially for its most vulnerable populations. The Intergovernmental Authority on Development (IGAD's) Drought Disaster Resilience and Sustainability Initiative (IDDRSI) was a crucial step towards working towards sustainable growth and developing and implementing climate resilient strategies to withstand climate shocks and environmental catastrophes, such as droughts, as well as the negative impacts, such as water shortages and devastated crop yields, that can result from them (IGAD, 2023). Developing international partnerships and collective problem-solving mechanisms that emphasize the need for coordinated efforts across East Africa will be essential with the coming climate crisis.

Similarly, the Horn of Africa Resilience Network (HoRN), established by USAID, attempts to build resilience and promote climate mitigation strategies in East African drylands to end extreme hunger, prevent the outbreak of violent conflict as a result of resource scarcity, and limit threats to development in this region (USAID, n.d.). However, another organization dedicated to promoting climate resilience within East Africa is WFP's Regional Resilience Framework Monitoring Protocol which tracks progress on resilience building in the East African region, allowing for increased accountability and continued monitoring and evaluation efforts toward progress (WFP, 2019).

Besides finance mechanisms targeting disaster risk and climate adaptability, the Ugandan government established a department dedicated to climate change within its Ministry of Water and Environment (CCU, 2018). These steps will be crucial in responding to climate change by building resilience within its borders, reducing its dependence on donors

and international aid, and leveraging its resources to reduce climate risk with an emphasis on country ownership.

As a part of their strategic plan to promote equitable access to water resources, the Ministry of Water and Environment started planning for Catchment Management Plans (CMP) in 2011 (Ministry of Water and Environment). CMPs in the water sector intend to ensure that water has a long-term strategy for sustainable development in Uganda. Within the CMP structure, water management is decentralized and left to the local catchments to manage (Ministry of Water and Environment). Catchment management programs can and should be developed at the local level, and this should be encouraged through governmental incentive programs. Incentives have also been explored to motivate greater community involvement in water management. An example is the Water Towers project in the Elgon mountain region, where the Directorate of Water motivated communities by giving small “honoraria” tokens to community members who read gauges installed in rivers. (CIFOR 2018)

Additionally, an essential target of climate policy and a component of promoting country ownership as regards climate change is cultural heritage. Many cultural heritage sites around the world, including those officially endorsed by UNESCO, are in danger due to climate change’s long-term damaging environmental effects and shorter-term extreme weather events (Sesana et al., 2021). Culturally relevant sites such as the Fort Luba/Fort Thurston memorial site, the Rwenzori Mountains National Park, Wang-Lei, and more are all threatened by climate change’s damaging effects.

Climate-induced displacement and community disruption also affect how communities practice traditional beliefs and ways of life, thus affecting intangible aspects of cultural heritage such as customs, traditions, and skills (Higgins, 2022). Indigenous advocates have been some of the first to bring attention to the impact of climate change on cultural identity and the damaging psychological effects of witnessing the degradation of these identities (Higgins, 2022); cultural practices that are embedded in and integral to one’s identity can be lost as a result of climatic changes forcing societies to adapt and move away from these traditional practices.

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A shared sense of national identity or interconnectedness is an important component of promoting country ownership, as shared practices unite citizens as agents of change in their own country and communities. Cultural heritage sites provide such a rallying point and are important national symbols and points of pride. However, there is an overall lack of international collaboration and governmental attention to safeguarding important heritage sites from climate change (Orr et al., 2021). Thus, Uganda’s climate policies need to prioritize the preservation of these sites and the use of these sites to stoke a sense of community responsibility. Strong collaboration between local, indigenous, and governmental actors will protect tangible and intangible cultural heritage sites from climatic effects.

However, cultural heritage relates to cultural sites and encompasses traditional practices, ways of living, and regional biodiversity. Sustainable conservation practices are essential to maintaining the health of Uganda’s ecosystems and natural resources, which are integral to Uganda’s national identity. Climate change threatens this biodiversity, as the conservation of chimpanzees and other primates is threatened due to habitat degradation and loss. This habitat loss prompted clan leaders in Uganda to call for their conservation utilizing discourse related to cultural heritage, indicating the importance of the natural world and Uganda’s unique ecosystems and biodiversity to its citizens.

The Obusinga Bwa Rwenzururu clan leaders said, “Culture defines our way of life and identity. Culture influences all stages of our lives, from birth, initiation, marriage, celebration, and death. In our community, clans identify with totems that are important to our identity. These totems may be in the form of animals, plants, or instruments with significant cultural value and to which we have social attachment. Our families pass knowledge about each clan and its totem(s) to the next generation, reinforcing a sense of identity and belonging to the clan. Some of our totems are endangered while others have become extinct due to human activities, such as forest degradation destroying different plant and animal species and their habitats” (Cross Cultural Foundation of Uganda, 2019). Through this statement, which encouraged the protection of cultural heritage, including totems and their habitats,

clan leaders emphasized their commitment to protect the natural world around them and promote conservation efforts.

Climactic changes may also impact ecotourism within Uganda, which plays a large role in its citizens' financial security and livelihoods (Coldrey & Turpie, 2020). Not only can ecotourism be an essential component of Uganda's economy, especially given the large number of national parks and the attraction of gorilla tourism, but it can also be used to develop conservation projects. However, care must be taken to ensure that ecotourism does not become unsustainable and is properly managed so it does not damage the natural resources upon which it is predicated.

Investing in community capacity enhancement, prioritizing accountability and transparency mechanisms in the Ugandan government, and encouraging community participation will be essential aspects of climate policy development in Uganda. When identifying actionable items promoting country ownership of climate mitigation and adaptation efforts, agriculture, forestry, and energy are three sectors that are some of the most crucial areas to target.

Based on the evidence in this section, the Committee concludes the following:

1. Communities are actively involved in climate action, with verifiable examples of communities planning and owning their cost-effective climate adaptation interventions.
2. Most climate change adaptation is project-based and controlled at national and international levels, with minimal community input in the planning and design.
3. The agriculture and food production sector is heavily impacted by climate change.
4. There is a knowledge deficiency for methods and innovative tools to encourage program design and implementation ownership. Exemplar tools exist but are not publicized.
5. Data for action and integration of adaptation strategies remain siloed.

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6. There is an economic opportunity for community-owned driven development of value chains across systems (agriculture, tourism, forestry, fisheries) to promote community action.
7. Circular value chains provide interlinkages for products and services, making agricultural and environmental systems more resilient and sustainable

Based on these conclusions, the Committee recommends the following:

1. The Government of Uganda should domesticate and downscale global recommendations to make them actionable and promote community action and ownership.
2. Nature-based solutions are already in practice and must be recognized, upscaled, and addressed as a system with all cross-cutting elements.
3. There is a need for mindset and attitudinal change by the program designers to give freedom to communities to participate and make choices in climate community action programs.
4. Communities should lead the development of innovative tools for climate action to promote ownership due to the multiple benefits of enhanced food security.
5. The Government of Uganda should develop a national policy for managing data for planning and action to ensure data is retrievable and de-siloed.
6. ESG / CSR for commercial companies should include community support for climate action through upscaling and cascading existing campaigns, for example, climate runs and *obulunji bwansi* programs.

EXISTING POLICES, FRAMEWORKS, AND MULTI-LEVEL GOVERNANCE SUPPORT SYSTEMS FOR COMMUNITY ACTION

Uganda's development path to a climate-resilient, climate-just, and low-carbon society is continuously evolving and is essential for long-term sustainable national development; this path will necessitate establishing a strong response strategy integrating effective and equitable mitigation and adaptation strategies. In the last two decades, Uganda has made huge strides in forging a coordinated, robust national climate change response and policy framework that can be translated to actionable targets with tangible benefits. These policies are focused on ensuring the sustainable development of Uganda's sociocultural and economic sectors and emphasize the need for plans ensuring equitable growth targeting the most vulnerable populations. These national-level policies also highlight the importance of developing strategies in a participatory, bottom-up approach, ensuring that various groups' needs are addressed and incorporated into the national framework.

The East African Community (EAC) recognizes climate change as a global threat to sustainable development, particularly in the region. In 2011, EAC member states developed the East African Community Climate Change Policy (EACCCP) to collectively address the adverse impact of climate change in the region. The EACCCP was developed in response to the growing concern about the increasing threats of the negative impacts of climate change to national and regional development targets and goals. This policy prescribes statements and actions to guide climate change adaptation and mitigation to reduce the region's vulnerability, enhance adaptive capacity, and build socioeconomic resilience of vulnerable populations and ecosystems. The policy is consistent with the fundamental principles of the treaty establishing the East African Community and following the EAC

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Protocol on Environment and Natural Resources, the Protocol on Sustainable Development of Lake Victoria Basin, the Kyoto Protocol, the Paris Agreement, and the United Nations Framework Convention on Climate Change (UNFCCC). However, the successful implementation of this policy requires collaborative efforts by all national states to minimize the overall impacts of climate change. The EAC Climate Change Master Plan (EAC-CCMP, 2011-2031) provides a long-term vision to operationalize a comprehensive climate change adaptation and mitigation framework through strengthening regional cooperation to address climate change impacts on shared resources such as wildlife and water ecosystems.

Countries in the region also established the East African Climate Smart Agriculture Platform (EACSAP) in 2014 to promote agricultural productivity, adaptation, and resilience to climate change through technological innovation (Ndung'u & Azomahou, 2023). Most of the region's adaptation policy priorities focus on livelihoods, energy, forests, agriculture and food security, disaster response, transport, and coastal zones. However, a lack of horizontal linkages across countries and policies limits regional policy coherence (Price 2018). This highlights the need to coordinate efforts among the government, the private sector, and civil society to maximize the implementation of existing policies (see Fig. 1 and Table 1).

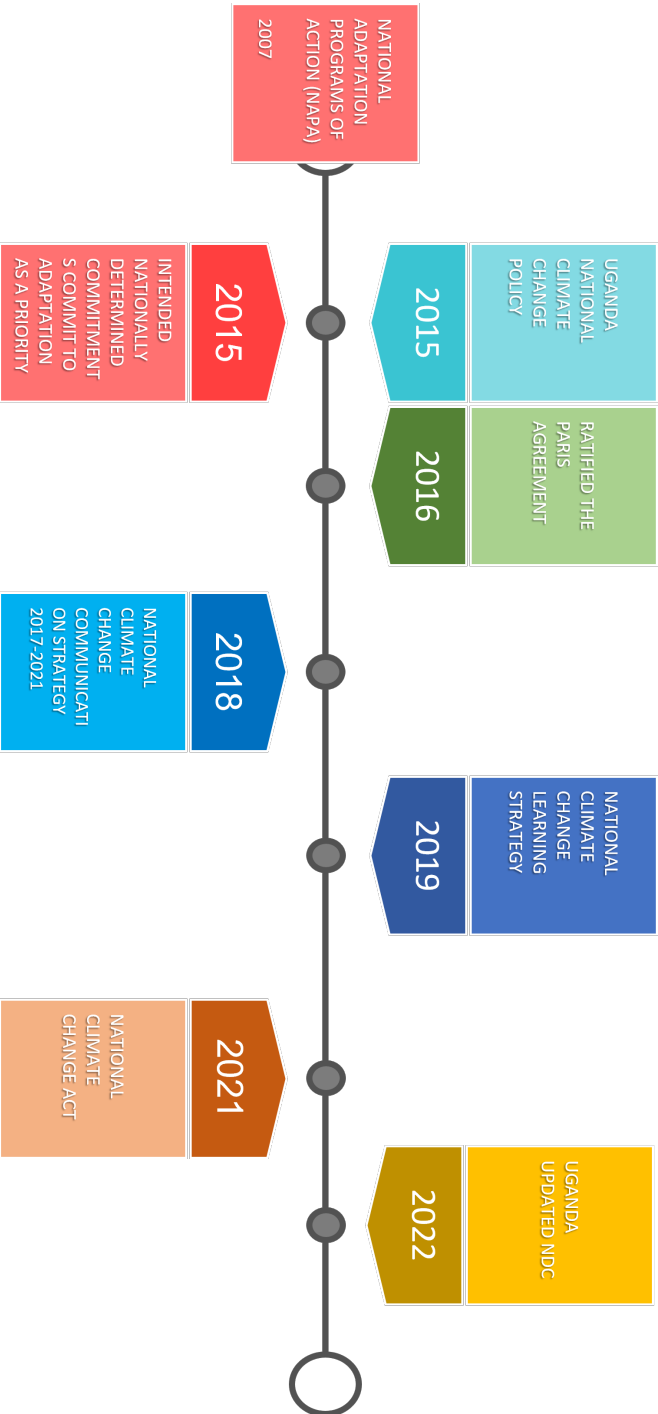


FIGURE 1 Uganda Climate Response Timeline

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TABLE 1 Uganda’s National Climate Change Legal and Policy Framework

National Policy and Framework	Description	Impact at the Community Level
National Adaptation Programmes of Action (NAPA 2007)	Identified immediate, urgent, and priority project activities necessary to enhance the nation’s adaptation capacities to climate change.	NAPA projects were designed to counter specific urgent and immediate problems communities face to address the adverse impacts of climate change and variability. Includes a list of nine priority projects, many of which are yet to be implemented due to lack of funding.
National Policy for Disaster Preparedness and Management (2010)	Establishes institutions and mechanisms for effective disaster management, from vulnerability assessment to preparation and mitigation, and if needed, response and recovery. Includes other disasters, not only climate change.	Approaches disaster planning from every level of society, starting with communities. The policy itself plans for community participation and requires community participation to succeed.

<p>National Strategy and Action Plan to strengthen human resources and skills to advance green, low emission and climate-resilient development in Uganda (2013-2022)</p>	<p>This strategy aims to strengthen human resources and skills to advance low-emission and climate-resilient development. The strategy acknowledges the need to incorporate climate change knowledge into all business, technical, and vocational education and training.</p>	<p>This plan strengthens communities through the holistic recommendations, analysis, and efforts brought forth by the plan in the following capacities; strengthening the national education system, assessment of sectoral capacity and gaps to be filled, and expansion of information for sectoral response to the creation of industry where preparation for climate change knowledge is needed.</p>
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<p>Uganda's Intended Nationally Determined Contribution (2015)</p>	<p>Submitted in 2015, the NDC commits to the need for adaptation as a governmental priority. It also pledges a 22% baseline reduction in GHG emissions.</p>	<p>The priority of adaptation in this document includes advocating for vulnerable communities and sectors. Efforts such as extending electricity to rural communities and expanding climate information will enable communities to be better equipped with the knowledge needed to actively contribute to climate adaptation.</p>
<p>Uganda National Climate Change Policy (2015)</p>	<p>This policy recognizes climate change as the greatest challenge. It aims to ensure that all stakeholders address climate change impacts and their causes through appropriate measures while promoting sustainable development and a green economy. It mainstreams climate change issues across all government departments and harmonizes the Ugandan climate change policies with the East African Community policy.</p>	<p>Local government impacts communities most directly and allows them to mobilize or freeze. This policy recommends local-level governmental actions that can benefit community mobilization. The policy also explicitly promotes community-based approaches to adaptation.</p>

<p>Uganda NAMA on Climate-Smart Dairy Livestock Value Chains (2017)</p>	<p>NAMA aims to trigger resilient low-carbon development in the dairy sector by introducing climate-smart agricultural practices and bringing Uganda’s dairy production sector onto a low-carbon and more resilient path.</p>	<p>The implementation of the suggestions in this policy includes the training of farmers and the creation of farmers’ cooperatives so that farmers can participate in NAMA. The training will focus on feeding tactics, strategies, approaches, and economic training. This approach will build farmers and their communities’ ability to participate in climate change mitigation at the local level.</p>
<p>Uganda National REDD+ Strategy and Action Plan (2017)</p>	<p>This strategy aims to promote sustainable forest management, biodiversity conservation, and enhancement of forest carbon stocks.</p>	<p>Forest-dependent indigenous groups and programs for the poor were stood up to share benefits from the program equitably .</p>

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Uganda National Climate Change Act (2021)	The Act gives the force of law in Uganda to the UNFCCC, the Kyoto Protocol, and the Paris Agreement; provides for climate change response measures; provides for participation in climate change mechanisms; provides for measuring of emissions, reporting and verification of information; provides for institutional arrangements for coordinating and implementing climate change response measures; provides for financing for climate change; and other related matters.	The Act promotes harmony at all climate change prevention and mitigation levels, including at the community level. This Act is most holistic in defining how action at the community level ties to overall long-term climate change impacts.
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SOURCE: Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA)

Community ownership is hindered by Uganda’s many climate change policies, frameworks, and regulations but is not translated into appropriate implementation guidelines, especially at the local level. However, there are some successful policies, including the National Seed policy championed by NGO ISSD, a policy that was piloted within districts through local government ordinances that supported implementation. Additionally, it should be well noted that the government of Uganda is aware of and preparing for the impacts of climate change, to the extent that the country has been leading the charge on national-level efforts to prepare for, mitigate, and respond to climate change. An example of this earnest effort is Uganda’s position as the first African country to create and commit itself to its Nationally Determined Contribution Partnership Plan (NDC-PP) (IBRD-IDA, 2019). This work kicked off in 2018. Three years prior, Uganda created

its National Climate Change Policy (IBRD-IDA, 2019). Uganda has a Green Growth Strategy in place, contributed to the 2018 United Nations Framework Convention on Climate Change, and is actively working towards meeting the parameters of the Bonn Challenge (IBRD-IDA, 2019). Officials in Uganda have been introduced to and are utilizing technology to track climate change and respond accordingly.

Uganda's national level policies were complemented by its ratification of the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, the Kyoto Protocol in 2002, and the Paris Agreement in 2016, committing Uganda to an established international framework dedicated to addressing and mitigating climate change impacts. A concerted effort at both the national and international levels are essential for a robust climate action plan to be developed; an action plan will be unable to succeed without country ownership and restructuring previously donor-led priorities into development partnerships with full civil society and public participation. Uganda's national policy framework surrounding climate change reflects the shift to a more country-driven approach and underlines Uganda's commitment to developing and managing its own social and environmental plans.

In 2007, Uganda created the National Adaptation Programmes of Action (NAPA) to get ahead of the high risks associated with climate change. NAPA, overall, demonstrates how an institutional framework around climate change can facilitate the need for policy that facilitates expedient and prioritized action in cases where delay of action will impact populations quickly (Czerniak, n.d.). This framework was submitted to the United Nations Framework Convention on Climate Change (UNFCCC). A part of this effort was to establish a national Climate Change Unit. NAPAs are a standardized and expedited way to clearly articulate the country's needs to its Conference of Parties around mitigating and reducing the impacts of climate change on their citizens (The Republic of Uganda 2007). Uganda's NAPA focused on nine areas of priority—tree growing, community water and sanitation, drought adaptation, vectors/pests/disease control, indigenous knowledge, natural resource management, land degradation management, the strengthening of meteorological surveys, and climate change planning and development (Nyasimi et al., 2016). NAPA was implemented in

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2012, and its implementation was made possible by funding from the Danish government. Activities outlined in the plan were implemented at the community level. They were governed in partnership by the local government and various participating agencies, such as the Ministry of Water and Environment. An implementation period of one year was established. Unfortunately, a sustainability plan was not identified immediately for the actions implemented (Nyasimi et al., 2016).

An analysis of the effectiveness of the NAPA program can certainly be completed and is important in understanding the extent to which the program has helped create climate change preparedness. In addition to this effectiveness analysis, there should also be a review of how the NAPA preparation process was enacted and how learnings from this enactment can inform future action-oriented programs. Alongside the obvious goals of NAPA, the program was intended to bolster the country's commitment to eradicating extreme hunger and extreme poverty and combat disease (United Nations). A key learning from a process standpoint was how vulnerable communities, particularly women, were engaged in planning for NAPA. Equity was also targeted in the NAPA creation process by focusing on environmental sustainability and gender equity in fighting major diseases (United Nations). Climate adaptation was incorporated interviewing communities through inquiries of coping mechanisms (United Nations). Although sustainability issues were experienced with NAPA, the design of the program within a climate change infrastructure takes a community-based approach, with the most vulnerable at the forefront.

Many key takeaways were emphasized throughout the execution of the NAPA plan for those looking at Uganda's future in regarding to climate impact. These takeaways are essential to developing sustainable mitigation strategies centered on country ownership and engagement at the national level. This will ensure that programs undertaken fit the country's context and incorporate a flexible and constantly-evolving framework, avoiding a prescriptivist approach that takes decision-making and goal-setting out of the hands of the country itself. The takeaways are as follows:

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1. An evaluation of community preparedness should precede any action taken, starting with a vulnerability assessment to ensure those most at risk are being considered when developing national policy.
2. A core component of community readiness is ensuring the community can manage, monitor, implement, and track the prescribed activities (Nyasimi et al., 2016).
3. Building community capacity to reach this point may take varying periods, based upon the readiness assessment; implementation plans should be adjusted accordingly.
4. Capacity building for the local and national government around the above-mentioned components of program implementation should be a part of the preparation and ongoing process.
5. Not only do these basic tenets need to be a part of the implementation, but the ability to incorporate plans to prioritize the most vulnerable groups is a more nuanced approach to program implementation that needs to be internalized by those overseeing its execution.
6. Adaptive capacity should also be considered through the lens of the various livelihoods in communities. In other words, multiple interventions should accommodate community's strengths and increase the opportunity for impact.

Although the sustainability factor was a missed opportunity with the NAPA, the learnings from this initiative were used to help formulate other pledges on the same topic, such as the intended nationally determined contributions (INDC), the Climate Smart Agriculture Program and the National Adaptation Plan (Nyasimi et al., 2016). INDCs play a large role in developing a sustainable national development plan through a community-driven framework, emphasizing capacity building and engagement centered on national guidelines and building country ownership (GCF, 2017). A study conducted by the African Development Bank Group (AfDB) and the Climate Investment Funds (CIF), which the AfDB administers, found that the INDC was in alignment with national policies, as it was derived from the Second National Development

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Plan and 2015 National Climate Change Policy, along with investment plans obtained from the Ministry of Energy and Mineral Development (AfDB, 2015). Additionally, subsumed under these development plans is the National Vision Framework, which incorporates climate-forward thinking into its “plans and strategies to transform Uganda from a peasant to a modern and prosperous country by 2040” (Nyasimi et al., 2013).

The focused implementation of INDCs was essential to support the transition to and adoption of NDCs, solidifying Uganda’s commitment to reducing greenhouse gas emissions targets. In Uganda’s updated 2022 NDC, it is stated that Uganda will reach a mitigation target of 24.7% below the Business As Usual (BAU). This is a more ambitious target than stated in the 2016 NDC, at a 22% reduction. The updated NDC also added sectors to its scope of focus, which now consists of wetlands, biodiversity, mountains, risk management, energy, infrastructure, water, forestry, and agriculture. The overall approach of the 2022 NDC aims to improve adaptation against vulnerabilities specific to each sector, build adaptive capacity, adjust for loss and damage, and to strengthen the resilience of ecosystems, infrastructure, and communities.

Uganda’s third National Development Plan (NDPIII), released in 2020, the Uganda National Climate Change Policy (NCCP), released in 2015, and the Uganda Vision 2040, released in 2013, further recognize the threats climate change presents to Uganda’s national economic and social development, and emphasizes Uganda’s resolution to tackling the threat of climate change. The NDPIII even states its intention to review Uganda’s 2015 NDCs (NDPIII 2020). The NCCP was also crucial in developing actionable climate change policies and promoting country ownership in developing adaptation and mitigation strategies. The NCCP was designed within the context of the country’s 2040 Vision and national development priorities, emphasizing the importance of national engagement in developing goals and strategies that fit Uganda’s unique conditions (MWE, 2015). Adaptation policy priorities identified by the NCCP include creating resilient and sustainable mechanisms to manage agriculture and livestock, water and forestry resources, fisheries and aquaculture, transportation infrastructure, wetlands and biodiversity, population health, energy access and utilization, wildlife and tourism,

urban planning and social infrastructure, and disaster risk reduction within Uganda. Within this, certain sectors such as forestry, land use, agriculture, energy generation and utilization, and waste management will be targeted to develop policies related to mitigation strategies.

Agriculture, forestry, and energy are three sectors essential to Uganda's economy and the sectors that a changing climate will most impact. The NCCP complements the Climate Smart Agriculture program created by the United Nations Development Program (UNDP) and the Common Market for Eastern and Southern Africa (COMESA) that aims to increase agricultural system resilience to food shocks, such as those presented by climate change (UNDP, 2022). The NCCP further recognizes the need for a legal and regulatory framework to provide structure for protecting these sectors and the needs of vulnerable groups when developing national plans, policies, and budgets that can be translated into actionable items.

The Uganda National Climate Change Act, created in 2021, further complemented previous efforts to develop actionable climate policy. The Act defines itself as “an Act to give the force of law in Uganda to the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement; to provide for climate change response measures; to provide for the participation in climate change mechanisms; to provide for measuring of emissions report and verification of information; to provide for institutional arrangements for coordinating and implementing climate change response measures; to provide for financing of climate change; and for related matters (The Republic of Uganda 2021).”

The Act highlights its plans in governing around plans it proposes, stating that lower local governments will be held responsible for the contents of the act itself, calling for specific committees to be created to manage the climate change strategy. Some of the responsibilities on these local governments are: the implementation of the District Climate Change Action Plan at the municipal, town, division, county, sub-county, parish and village levels, as the case may be; preparing work plans for climate change adaptation and mitigation activities within their local jurisdictions for purposes of implementing the District Climate Change Action Plan, conducting education and awareness campaigns on climate

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change within their local jurisdiction, mobilizing the people within their local jurisdiction to implement climate change adaptation and mitigation measures and actions, monitoring and evaluating of climate change risks, adaptation and mitigation activities within their local jurisdiction, reporting any events or activities which negatively affect or are likely to negatively affect the implementation of climate change adaptation and mitigation actions and measures, and carrying out such other duties as may be prescribed by the district council or urban council in consultation with the District Natural Resources Department (The Republic of Uganda 2021). The above responsibilities provide plentiful opportunities to ensure equitable community participation.

The driving principles behind community ownership, including equitable representation of all groups and sectors, leading with the consideration of most acute health risks related to climate change, should be core principles of local government's approach when coordinating in their communities. Key characteristics of a coordinated and equitable approach include:

1. Representation of all citizens regardless of class, gender, occupation, or age, including representation from all sectors, not only those that work directly with the environment.
2. Considering the vantage points of those in various fields such as education, agriculture, arts and culture, religious spaces and spiritual leaders, and healthcare. A multi-sectoral approach will build a robust plan for implementation and drive ownership across disciplines.
3. Prioritization of the most vulnerable groups and severe health risks first, which includes how to structure community goals and efforts to ensure the protection of these groups and prevention of the most threatening health risks.

Furthermore, when implementing the programs that come out and continue to be carried out as a result of The National Climate Change Act, some strategies that can be taken to coordinate an equitable approach:

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1. Close engagement with local leadership over the villages, towns, and cities should be a constant.
2. A committee of citizens representing marginalized groups in various sectors should be the basis for forming the levels at which strategies are formulated, communicated, and implemented.
3. A Climate Change Ambassador program should be considered. These individuals should represent and mirror their communities and can advocate for them on their behalf. These individuals may also have a certain level of influence in their communities and be willing to educate and share information with their neighbors.
4. Education on climate change should consistently occur in primary and secondary schools, starting at a young age, including opportunities to get involved in climate change projects.
5. Incentive programs and strategic government funding towards programs within communities that require the most attention should be created.
6. Mass awareness campaigns can serve as a mechanism to make Ugandans aware of what efforts are taking place at the national level and allow for sharing between districts, cities, and sectors.
7. Knowledge sharing of best practices and coordination around efforts can stem from these awareness campaigns. A mechanism that may be used to drive the content in the campaigns is a database for logging climate change efforts and interventions, tracking data, and tip sharing.

Barriers to Effective Implementation of Policies

The gap between policy intent and policy implementation must be analyzed, and learnings incorporated into these efforts moving forward as the connection between the creation of policy and the impact of policy is becoming more and more imperative with the timeline of climate change impact. Awareness of policy at the local level is inconsistent; without awareness, community ownership and action cannot be taken to enact or comply with the policy. Policy efficacy is often limited by sectoral segregation, which links back to the driver of inadequate inclusion of all

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key actors during the policy formulation process (Ampaire et al., 2017). Policies written without including all key participants will not account for the needs of the most vulnerable nor address the urgent adaptation and mitigation constraints of communities.

A common barrier to effective policy implementation is the technical limitations and human resource constraints at the local level and in public office (Ampaire et al., 2017). The power dynamics between local leaders and the government also impact policy formulation and implementation. Roles that used to be held at the local level and should still be to promote inclusion and representation are not centralized at the national government level (Ampaire et al., 2017). District and local-level governments, therefore, have limited decision-making power. This impacts the bi-direction flow of information up and down attempts to implement policy in settings where it is not fitting. Allocation of resources toward policy communication will decrease the knowledge gap in policy awareness. Special attention on these two efforts should be placed on rural communities and communities with resource-light governing structures. There are a variety of barriers to the effective policy implementation in Uganda (see Fig. 2).



FIGURE 2 Barriers to Effective Implementation of Policies in Uganda

SOURCE: Ampaire et al., 2015.

LEVERAGING MULTI-SECTORAL PROGRAMMING

Emphasizing multi-sectoral partnerships and engagement, investing in community capacity building, prioritizing accountability and transparency mechanisms in the Ugandan government, and encouraging community participation will be essential aspects of future climate policy development in Uganda. According to the Notre Dame Global Adaptation Initiative (ND-GAIN), Uganda is the 13th most vulnerable country in the world to the detrimental effects of climate change (Notre Dame Global Adaptation Initiative, 2023). The threat to food and water is the primary driver behind this ranking for Uganda. Projected changes in cereal yields, population size, vector-borne disease distribution, flood hazards, and biodiversity all have the potential to affect Ugandan citizens (Notre Dame Global Adaptation Initiative, 2023).

These environmental changes not only have the potential to affect individuals' health directly but also may indirectly lead to political instability and social strife due to competition over rapidly dwindling resources, further challenging peacebuilding and development efforts in nations worldwide. Climate change may accelerate instability for violent conflicts worldwide, such as by affecting economic output and resource availability and possibly influencing environmentally-induced migration (Koubi, 2018). Increased social and political instability, especially if compounded with food and water insecurity, high levels of climate refugees, and other climate stressors, will limit the ability of many countries in this region to embrace country ownership of their climate policies fully.

When identifying actionable items promoting country ownership of climate mitigation efforts, forestry, energy, and agriculture are three sectors that are some of the most crucial areas to target due to their essential role in the everyday lives of citizens and their susceptibility to exploitation and manipulation. It is thus essential to prioritize

intersectionality and the integration of multi-sectoral programming when investigating building climate-smart, equitable solutions to challenges in these resilient sectors to social and economic shocks.

Forestry and Land Use

Uganda's immense natural biodiversity and forest resources are some of its greatest assets in terms of climate mitigation, especially given the essential role intact and healthy forests play in carbon capture, improved air and water quality, food resource availability, temperature regulation, and disaster protection, especially in urban areas. However, Uganda's forests are quickly depleted by large-scale land acquisitions, deforestation, and development projects, including those slated for use in the agricultural sector (Mabikke, 2011; Bamwesigye et al., 2022). Therefore, climate mitigation strategies promoting country ownership require the institution of robust land governance policies, the development of forest management practices, and a rejection of external forces promoting development at the expense of Uganda's natural resources. A lack of transparency and accountability within Uganda's land and forest management sector restricts the country's ownership of these essential natural resources that play a large role in climate adaptation (Bamwesigye et al., 2022).

Additionally, land and forest management play an essential role in Uganda's energy sector, another area extremely vulnerable to climate change and essential for Uganda's economic and social development. Uganda's energy sector relies heavily on biomass and hydropower, which are extremely vulnerable to shifts in precipitation rates and biomass availability (Nsubaga & Rautenbach, 2018). Especially for rural households in Uganda, many current energy needs are primarily being met through burning biomass such as wood, which contributes to deforestation and has many negative health effects. More must be done to promote education, and access surrounding cleaner cookstove materials (Bamwesigye, 2023).

Beyond the deleterious health effects, fuelwood harvesting and extraction may lead to land degradation if not done (Sassen et al., 2015), creating a vicious cycle wherein more investment is needed to search for

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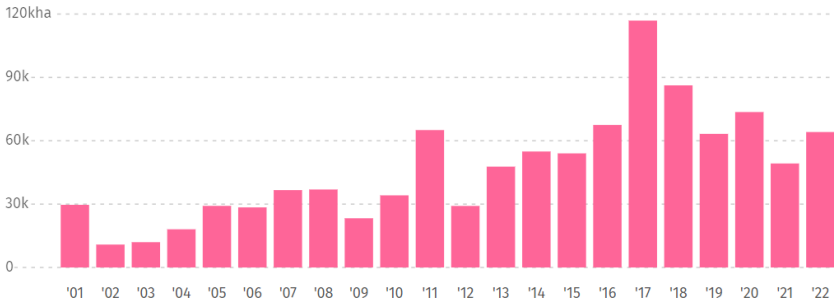
and collect fuelwood as the demand outstrips supply. Reductions in the availability of fuel use then lead to increased household expenditures for other types of fuel, which may be prohibitively expensive in some communities (van Hove & Johnson, 2021). As populations increase and urban areas expand, the demand for readily available energy will only increase (Avellino et al., 2018). Given that Uganda has extremely low stored carbon, also known as carbon stock, in relation to other global players (Otim et al., 2022), diversifying energy sources and moving away from traditional energy models could promote country ownership and energy democratization at the local level. According to The Carbon Collective, carbon stock helps mitigate climate change by providing a safe replacement for atmospheric carbon dioxide (Stein, 2023).

Of Uganda's many intimidating outcomes of climate change, the loss of forests and tree cover is currently causing disruptive impacts on communities and wildlife alike. Deforestation in Uganda results in drought and inconsistent rainfall, creating a microclimate that is not ideal for communities or wildlife to thrive (International Monetary Fund 2022). The leading drivers of deforestation are charcoal and wood biomass utilization (Bamwesigye et al., 2020). As the journey continues to develop a financial strategy for renewable energy, there have been examples of grassroots efforts to understand, study, and reverse deforestation in Uganda. Charcoal and wood are used in poor and wealthier settings and in trade practices, often by women in Uganda, to bring in more income to the household. There is no doubt that these precious resources have moved the country along economically, functionally, and socially for many, many decades. Therefore, the reversing of practices in utilizing these resources will not easily be accomplished, especially without an easily accessible and affordable alternative option.

The data behind the deforestation trend in Uganda speaks for itself. The World Research Institute's Global Forest Watch provides telling visuals demonstrating deforestation's rapid pace over the last two decades (see Fig. 3 and 4). Unless there are expedient renewable energy source solutions to the deforestation issue, community-driven approaches, beginning with awareness of the trends and the issue, and its projected negative impacts on the health and longevity of communities, the country of Uganda will continue to experience mass tree loss.

TREE COVER LOSS IN UGANDA

From **2001 to 2022, Uganda** lost **1.03 Mha** of tree cover, equivalent to a **13%** decrease in tree cover since **2000**, and **463 Mt** of CO₂e emissions.



⚠ The methods behind this data have changed over time. Be cautious comparing old and new data, especially before/after 2015. [Read more here.](#)

2000 tree cover extent | >30% tree canopy | these estimates do not take tree cover gain into account

FIGURE 3 Tree Cover Loss in Uganda

Note: Mha = million hectares (Progress on the New York Declaration of Forests 2020), Mt = metric tons (EPA, 2014)

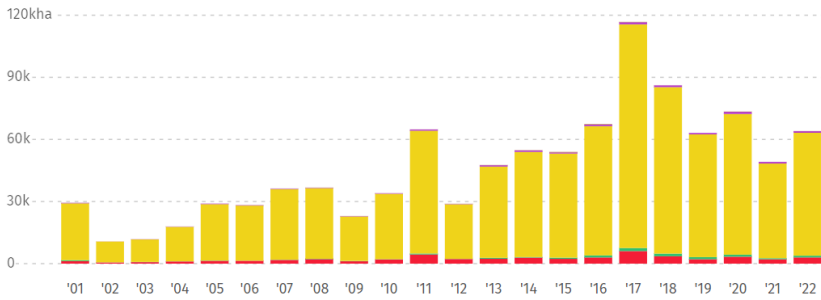
SOURCE: Global Forest Watch, 2023.

A 2023 study emphasized the importance of forest conservation for Ugandans, showing that increased knowledge of forest conservation and services led to increased support and willingness to pay for alternative energy sources (Bamwesgiye, 2023). Promoting community engagement and integrating indigenous land management practices into the forest management and energy sectors within Ugandan policy could be an effective strategy to drive increased country ownership. Additionally, introducing policy tools such as government-sponsored market incentives and subsidizing alternative energies could promote large-scale large scale adoption of a more sustainable energy infrastructure embedded within Ugandan communities (Bamwesgiye et al., 2022). Utilizing incentives also promotes the equitable adoption of low-carbon technologies, as greener decisions become the standard and the more financially feasible alternative. Especially in low-income or rural

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ANNUAL TREE COVER LOSS BY DOMINANT DRIVER IN UGANDA

In **Uganda** from **2001** to **2022**, **5.9%** of tree cover loss occurred in areas where the dominant drivers of loss resulted in **deforestation**.



⚠ The methods behind this data have changed over time. Be cautious comparing old and new, data especially before/after 2015. [Read more here.](#)

2000 tree cover extent | >30% tree canopy | these estimates do not take tree cover gain into account

2022	
Total	64.0 kha
● Forestry	836 ha
● Shifting Agriculture	59.4 kha
● Wildfire	67 ha
<i>Drivers of permanent deforestation:</i>	
● Urbanization	756 ha
● Commodity Driven Deforestation	3.00 kha

FIGURE 4 Annual Tree Cover Loss in Uganda

Note: In 2022, the primary drivers of deforestation were forestry, shifting agriculture, and wildfires

SOURCE: Global Forest Watch, 2023.

communities, financial barriers must not block individuals from accessing cleaner energies, and adopting these energies does not come with a financial burden.

Agroforestry and reforestation programs could also be useful adaptation strategies to rehabilitate existing nutrient-depleted land to improve productivity, with many implications for future food security

CASE STUDY 1
Community-Driven Efforts to Address Deforestation

Community-driven efforts to address deforestation have been driven by the youth in Uganda and specific examples of university partnerships have been able to create educational and awareness forces and increase tree planting in the country. In 2019, two activists began the My Tree Initiative, the goal of the initiative is to plant one million trees by the end of 2023. Enjer Ashraf and Ismael Tamale, the founders, are living examples of the impact that motivated and educated youth can have in the fight on climate change. They've mobilized hundreds of volunteers to plant trees across the country by engaging with students and universities, in November 2022 they had 8 universities participating in the challenge. The founders of the program also educate on the challenges associated with deforestation and the planting of trees as they recruit volunteers. The common uses of trees, in addition to utilizing them as the main energy source in the country, they speak to the governance challenges in Uganda around forests. Forests are often sold to private companies for the harvesting of sugarcane. Charcoal from the forests is also sold to neighboring countries.

The founders also place emphasis on the issue of the land crisis, noting that it is challenging to find a place to plant trees outside of the protected areas, and land that was being protected for the purpose of planting trees is being sold. Some of the planting that is taking place is being pushed forward in an expedient format in swampy areas, to make as much money as possible from the cutting and selling of the trees, and thus creating tree growth that is not contributing to a sustainable solution. The program utilizes social media channels and robust outreach strategies to school administrators to educate and engage with youth. They have two programs, one of which is called "Green Clubs," which are student-focused educational programs. They also have the "Green Talk Show," which is held weekly and online with youth, experts on climate change, and influential members of government such as those in the private sector and civil society. The work that Ashraf and Tamale are doing at the local level in Uganda are shining examples of how to drive sustainable change at the community level. Of course, local-level change is not ever going to fully realize its potential impact without substantial national-level governmental programs to support and sustain it.

SOURCE: International Monetary Fund 2022

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and agricultural output in this region . The Rwoho Central Forest Reserve is one example of an incentivized strategy for reforesting degraded areas. In this scheme, individuals become members and shareholders of the Rwoho Environmental Conservation and Protection Association; as communities plant trees, they are paid for the carbon sequestered by planting those trees and are given skills training in other forest-based enterprises and employment through maintaining the forest (Behr et al., 2012). These initiatives targeting community health and sustainable livelihood opportunities will be essential in future climate mitigation strategies. As discussed, given that many individuals in Uganda rely on subsistence farming, especially those in rural areas, these individuals must be provided with sufficient support to survive in a changing world.

Energy and Greenhouse Gas Emissions

Promoting the adoption of cleaner energies, such as through government-sponsored subsidies and other market incentives, will affect not only country ownership and climate mitigation strategies in the forest management sphere but also in the energy sphere. Investment in alternative energy infrastructure and the diffusion and adoption of these types of energy will be a critical component of Uganda's climate action plan. East African countries are continuing to develop their energy infrastructure, which leaves room for a unique opportunity to not only make an early and comparatively cheaper transition to low-carbon alternative energy infrastructure but also to promote country ownership by controlling their country's energy reserves, leapfrogging them ahead of higher-income countries that have sunk much of their energy infrastructure and financing mechanisms into fossil fuels and petroleum products.

Energy communities, which promote a shift in energy governance, the decentralization of production and consumption of energy sources, and active engagement of actors at the local level, have been proposed as a potential strategy for increasing energy democracy in sub-Saharan African countries (Ambole et al., 2021). A focus on decentralizing and democratizing the energy sector will be essential when developing alternative energy infrastructure and Uganda's capacity to mitigate

negative climatic effects and looking towards increasing energy access to rural and low-income communities.

However, equity issues when phasing out fossil fuels must also be taken into consideration, as blanket restrictions on fossil fuel emissions, even for countries that have not historically been some of the more robust greenhouse gas emitters, may not be the most equitable solution. Such a policy may deny economically developing nations from enjoying the benefits of a carbon-centered economy that other countries in the Global North have enjoyed for over 200 years; the implications for climate injustice as a result of historical inequities must be carefully considered when developing future mitigation plans (Meyer & Roser, 2010). Uganda’s oil and gas sector is experiencing rapid expansion, which has implications for future social and economic development. Figure 5 shows the relative contribution of different types of energy to Uganda’s energy consumption, with biomass dominating the mix.

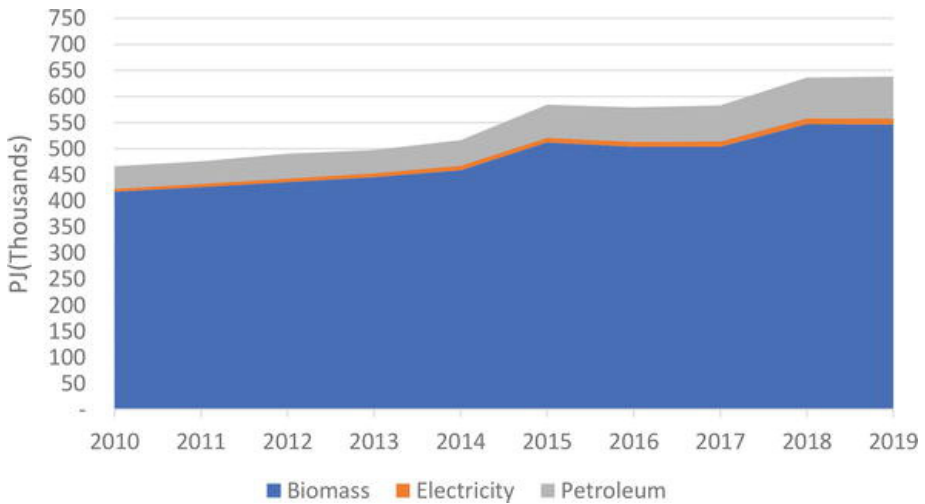


FIGURE 5 Contribution of Energy by Type
SOURCE: Twinomuhangi et al., 2021.

Figure 6 further shows the sectors consuming the most energy, which is dominated by household usage, likely due to the large amount of biomass consumption, as discussed, used in household cooking.

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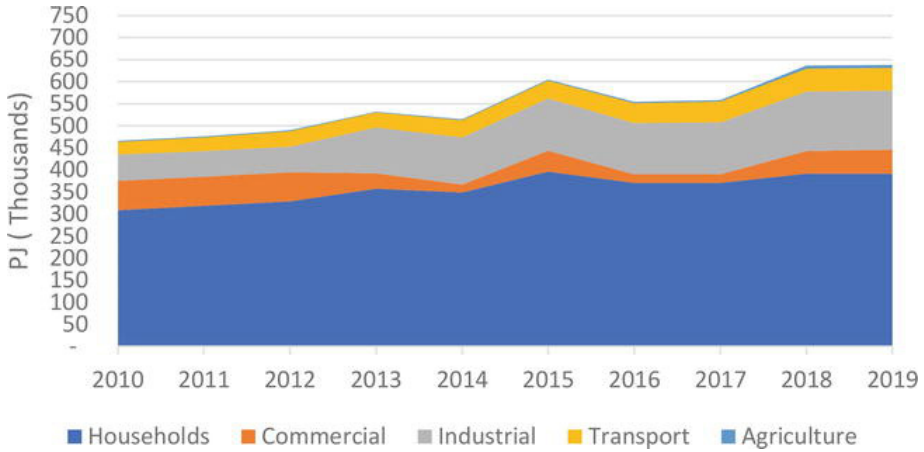


FIGURE 6 Energy Consumption by Sector
SOURCE: Twinomuhangi et al., 2021.

Care must be taken to ensure equitable access and sustainable growth in the energy sector while considering the climatic impacts of scaling up this sector. Developing a low-carbon framework that not only increases Uganda’s economic independence but also promotes energy equity, all while sustaining the economy, could be the essential component of embracing country ownership.

Reforming energy use will be essential to promote the growth and development of Uganda both socioeconomically and environmentally; this is especially true in the wake of the COVID-19 pandemic, which added pressures on energy systems and capacity. Additionally, according to the International Trade, while energy access in urban areas has reached nearly 60%, this drops to 20% in many rural communities, with only 1 out of 5 individuals having access to electricity. Figure 7 shows the number of households per region without access to electricity, which shows that although the urban region of Kampala has a fairly high electricity coverage, many other predominantly rural regions still lack a fair amount of energy access.

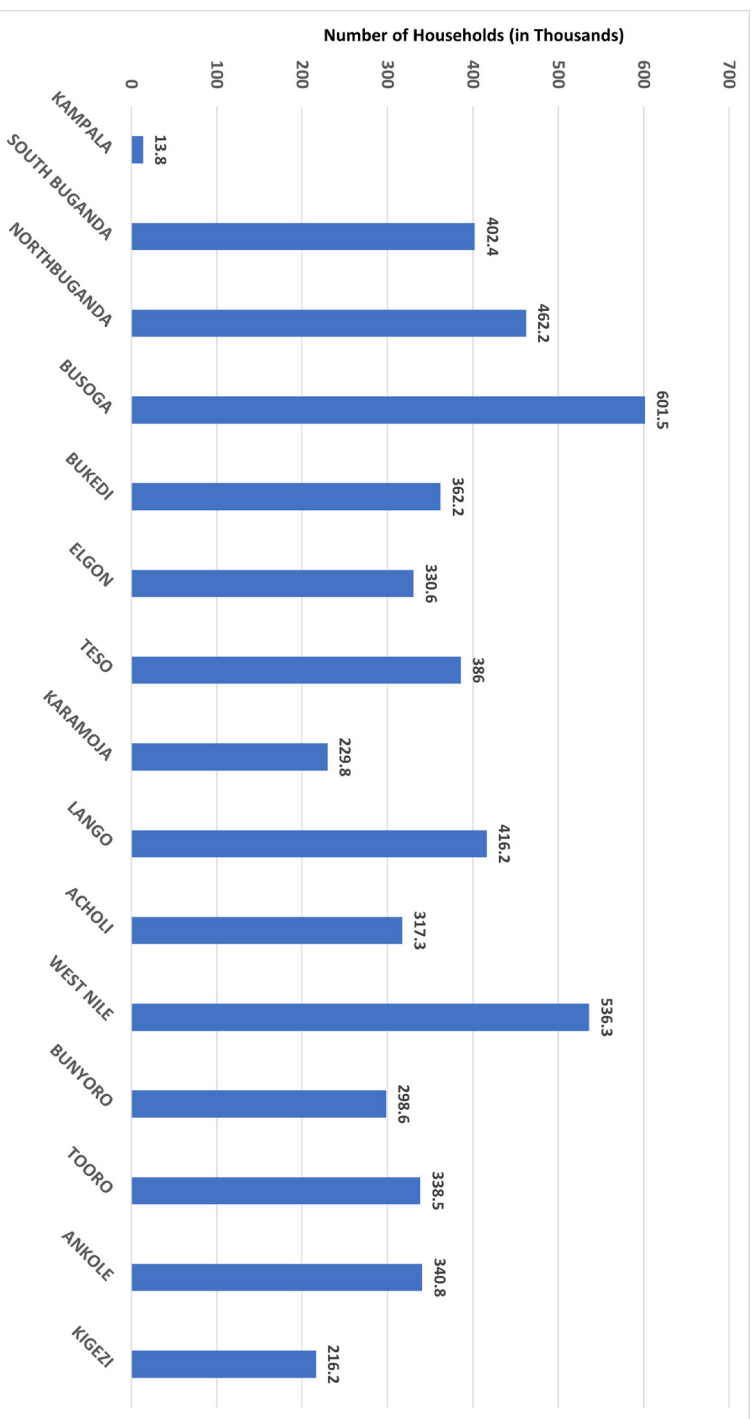


FIGURE 7 Number of Households per Region in Uganda Without Electricity Access
 SOURCE: Aarakit, 2021.

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Diversifying energy use and taking advantage of Uganda’s natural resources to promote the development of solar, wind, and sustainable biomass will reduce Uganda’s fossil fuel consumption and increase energy security for its citizens. Given Uganda’s geographic location along the equator, Uganda’s solar sector has a high potential for energy production . This potential remains untapped mainly, however, as challenges related to the exclusion of many communities from the national electricity grid, a lack of investments in solar production from the private sector, and insufficient regulation and incentivization in this sector all hamper attempts to harness this energy source (Avelino et al., 2018). Waste integration technologies also show high potential for improving sustainable energy consumption in Uganda through biomass waste to energy valorization (Gumisiriza et al., 2017). Although wind energy has generally not been considered a strong investment due to Uganda’s topography, this renewable energy source also has untapped potential to improve energy coverage in Uganda. However, development is challenged due to the high cost of investment in wind technologies, a lack of comprehensive data collected on wind patterns, and a lack of investment by governmental actors (Wabukala et al., 2021).

With support from BMZ (Germany), WWF Uganda has formulated a clear and actionable plan for transitioning to a fully renewable energy system by 2050. This has been through the “Multi-Actor Partnership (MAP) for implementing Nationally Determined Contributions (NDCs) with 100% Renewable Energy for All in Uganda by 2050 (100% RE MAP)” program.

The 100% RE MAP program facilitates positive changes and advances the transformation necessary to ensure economic and social development in line with the Paris Agreement’s climate target of 1.5 °C. By encouraging the participation of different stakeholder groups (i.e., government, civil society, business, academia, and development partners), they can facilitate the policy dialogues necessary for developing long-term transition processes to 100% RE. The inclusive, participatory nature of MAPs promotes a greater sense of ownership over outcomes and, consequently, strengthens their sustainability. One of the major outcomes of the project is to develop policy roadmaps, including technical scenarios on 100% RE as a driver for development.

The project recruited a consultant to develop the Scenarios for Uganda. As part of the assignment, the consultant will also build the capacity of the stakeholders on how to use the RE scenarios for their initiatives and priorities.

Access to energy and electricity is a crucial factor in many spheres of life, including sanitation, healthcare, education access, food systems, and the provision of transport, communication, and social services; thus, developing a robust and actionable energy plan focused on providing energy to the communities that most need it is another essential component of country ownership. In the coming years, especially when considering projected population growth in Uganda, promoting energy equity through the development of an inclusive and just energy infrastructure will play a large role in determining the trajectory of Uganda's development. Although Uganda's 1999 Rural Electrification Strategy, with support from the UNDP/World Bank Energy Sector Management Assistance Programme (ESMAP), includes components to prioritize increasing accessibility, equity, and sustainability, there is a need to continue investigating barriers and solutions to energy access across Uganda (ESMAP 1999). Special attention must be made to service accessibility and equity implications surrounding resource distribution and the commodification of natural resources.

The energy crisis has also become a geopolitical issue that has been a defining factor in the current climate crisis. A worldwide restructuring of climate finance mechanisms will be crucial in determining a country's climate adaptability and resilience, which will require a severe overhaul of the energy sector across the board, emphasizing sustainable growth and climate-smart infrastructure. Developing microfinance institutions driven by country interests that promote the growth of and access to renewable energy will be another essential component of Uganda's climate action plan (Chirambo, 2017). The World Bank's Disaster Risk Financing and Insurance Program (DRFIP) is one such mechanism that may offer some protection within the increasing climatic instability by promoting the development of financial protection strategies and social safety nets, helping to build climate resilience, especially in low-income communities (The World Bank, 2023).

CASE STUDY 2
Community Impacts of Expanded Energy Access

Expanding improved access to solar energies was an essential component of increasing energy access, improving social cohesion and reducing energy poverty in Uganda. One qualitative study on the impacts improved lighting and energy access had on the psychosocial health of participants showed that lighting strengthened community relationships, improved social status and lessened stigmas associated with poverty (Ponticello et al., 2023).

One individual commented: *When I would walk around at night and see houses with better lights, it would annoy me. I would feel jealous of what they have because I wished to have better lights like they do. When I was here, the study brought me solar lighting and I was very happy. I don't need to be jealous anymore. The solar lighting put me on their standard.*

This shows how essential electricity access is when trying to promote community cohesion and reduce the stigma associated with poverty and lower-income households. Promoting community cohesion and collaboration will be essential when building resilience and initiating adaptation strategies at the local level.

Energy access challenges are not only specific to Uganda but many households across sub-Saharan Africa. Alarming, by 2030 it is estimated that 665 million people will be without electricity, an 11% increase from 2021 (Butu et al., 2021). The goal of SDG 7 is universal access to clean, reliable, and affordable energy (United Nations). Sub-Saharan Africa is not currently on track to meet this target. Uganda is also at risk of not meeting this target, ranking 7th on the list of the top 20 access-deficit countries, with 26 million people without access to electricity (IEA, 2023). Limitations, such as a lack of small-scale systems and microgrids, governmental budget constraints, population increases, especially in urban areas, and institutional capacity, including funding, have led to energy deficits in the region.

Integral to discussions regarding energy use is a concentrated effort to evaluate emissions and fossil fuel usage. Low-carbon development pathways are a core part of the Sendai Framework for Disaster Risk Reduction, the UN Global Goals, and the UNFCCC Paris Agreement

(Lwasa, 2017). Although findings can certainly be drawn from these institutions and other rapidly developing urban areas, Kampala is unique and must have a strategy that best represents its specific needs. For example, the informal sector in Kampala makes up a large majority of commerce, housing, and need for essential services. Urban development in Kampala city should include the informal sector as one of its key priorities when looking forward. This grouping's contributions to emissions have not historically been included when measuring the output of emissions. However, this group is part of the human and commerce infrastructure, which makes up the web around the level of emissions and the needed resources to further the informal sector and continue supporting individuals' livelihoods.

The partnership between the Ministry of Lands, Housing, and Urban Development, Kampala Capital City Authority (KCCA), and the five divisional urban councils should be tightly aligned around the city's carbon footprint goals for urban planning and infrastructure development. Bundled carbon reduction, GHG savings projects, and National Appropriate Mitigation Actions (NAMAS), as recommended by the UNFCCC, are high-level strategies other African cities undertake. Market-based carbon credit programs, or strategies to reduce emissions at the lowest possible cost, are well-defined well defined and should be considered in urban planning. For example, in Mbale, Uganda, compost plants that capture organic wastes for compost purposes before the waste reaches landfills provide compost to farmers (Lwasa, 2017). Strategies such as these to reduce additional spatial fragmentation and to support communities that are already impacted by it include a focus on transportation options that include biking and walking to reduce greenhouse gas emissions related to transportation as much as possible.

In the energy sector, stationary buildings are currently the largest emitter within the sector that emits the most greenhouse gasses compared to other sectors (Lwasa, 2017). Adaptation and mitigation strategies should consider solar energy approaches and reusing waste-laden energies. In Kampala, pilot activities for bio-energy production and solar power are underway and can be implemented at the local/household level and scaled to span the city (Lwasa, 2017). When considering how to set up decentralized waste management systems to

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support the spatial layout of Kampala city infrastructure and residents, an approach that minimizes the need to pump water as much as possible should be utilized and standing up sewage and water treatment plants where needed in various areas of the city. The World Bank supports these types of decentralized city resource efforts. From a policy and legislature standpoint, buildings can be recoded to promote green energy.

Alternative or low-carbon energies will also be essential to reaching the Paris Agreement goals. Given that very little investment in clean energies currently makes it to emerging and developing economies, adjustments to funding priorities and a concerted effort to increase energy access need to be operationalized (IEA, 2021). Many developing economies have a unique opportunity to take advantage of historically lower investment in an energy structure reliant on greenhouse gas emissions, making the transition to a greener economy and energy grid faster, easier, and cheaper than many higher-income countries. Given that much of Uganda's climate financing will be dedicated to energy, developing a sustainable energy plan for the country emphasizing energy equity will be essential to the national climate change agenda. Energy equity will also play an important role in increasing country ownership, as transparency, accountability, and building institutional trust are essential when increasing participation and investment in national development at the community level.

Agriculture

Uganda's agriculture sector will be an essential determinant of how Uganda reacts and responds to the looming climate threat. Especially given Uganda's reliance on agriculture to sustain its growing population, continued progress in developing sustainable agricultural mechanisms will be essential to support the livelihoods of individuals living in Uganda. Figure 8 shows the importance of subsistence agriculture for household livelihoods in Uganda, with over 50% of women in Uganda working in subsistence agriculture following the beginning of the pandemic, emphasizing the importance of maintaining a sustainable agricultural sector in the wake of climate change.



FIGURE 8 Share of the Working-Age Population (14-64) Working Solely in Subsistence Agriculture by Sex and Year
 SOURCE: Willman & Arnold, 2022.

Figure 9 shows the relative regions that support different sectors of Uganda’s agriculture, fishing, and livestock industries, all of which are essential to supporting Ugandan livelihoods and, as will be seen in later maps, are vulnerable to climatic changes.

Efforts at instituting agricultural reform incorporating community feedback when developing agricultural systems and programming have had mixed results. Establishing the National Agriculture Advisory Services (NAADS) Programme in Uganda was one attempt at community-led agricultural reform that has experienced limited success because of a lack of community buy-in (Rwamigisa et al., 2017). Many have criticized NAADS for being driven by donor interests rather than prioritizing feedback from domestic voices and local stakeholders,

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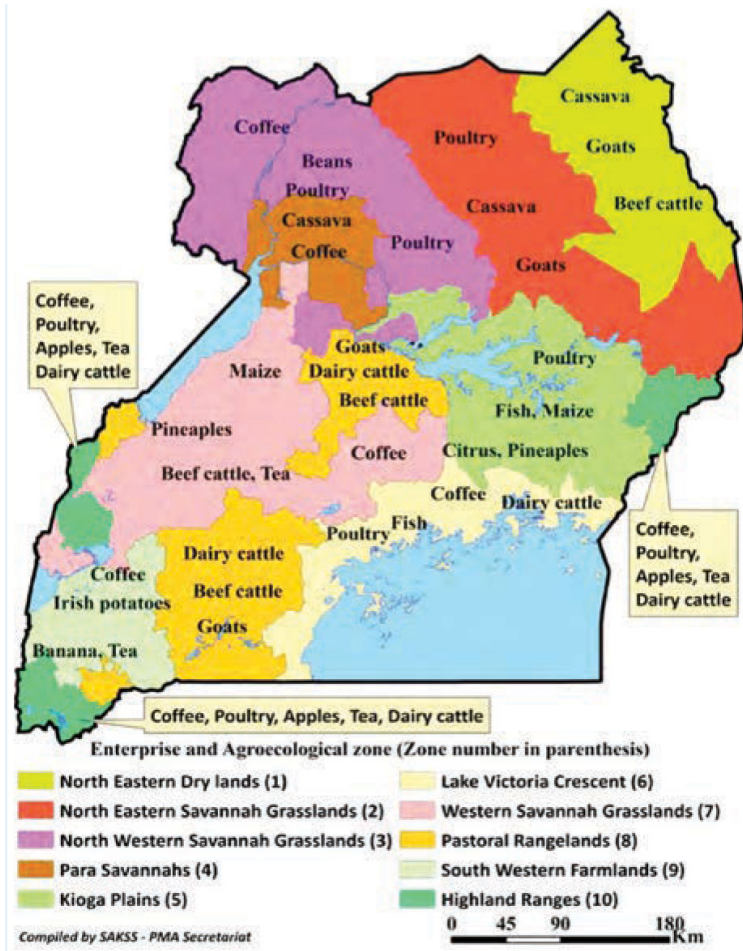


FIGURE 9 Uganda’s Agro-Ecological Zones
SOURCE: World Bank, 2021.

thus simultaneously threatening country ownership and the strength of Uganda’s food systems (Rwamigisa et al., 2017; Kjær & Joughlin, 2012). While many aspects of NAADS were praised for its innovative and decentralized design, focusing on increased governance and consensus in this sector may have led to less mixed results. Utilizing and integrating indigenous knowledge and practices into agricultural reform could be essential in promoting country ownership of agricultural

practices while promoting natural resource management practices (Akullo et al., 2007).

Reductions in water, food, and energy yields may act as threat multipliers and exacerbate pre-existing regional tensions and resource scarcity that can precipitate conflict and economic shocks within East Africa (Mugeere et al., 2021). Climate-induced pest infestations, arable land degradation, threats to soil ecosystem health and longevity, and reductions to water quality and availability all have the potential to affect agricultural production and food system infrastructure within Uganda; in turn, this can negatively impact food security in the region (Nuwagaba & Namateefu, 2013). Changes to annual rainfall and temperature have already been noted in Uganda, which may further impact agricultural production (Nsubaga & Rautenbach, 2018).). Figure 10 shows the predicted changes in precipitation based on different climate futures (baseline, driest, wettest) that will be decided based on the intensity of international action to mitigate climate change.

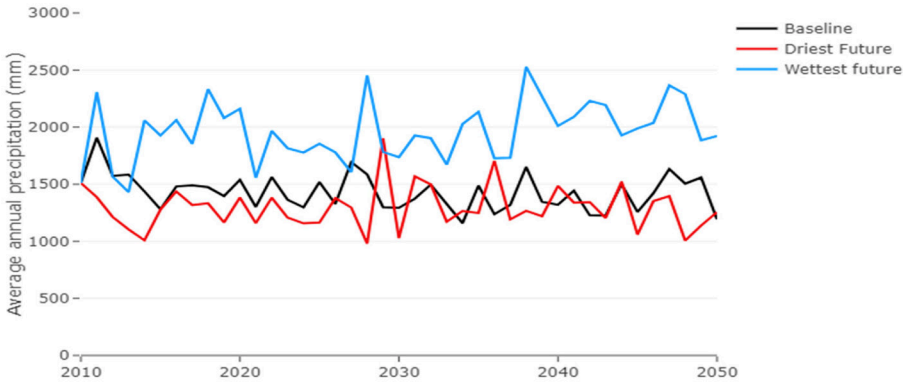


FIGURE 10 Predicted Precipitation in Different Climatic Futures
 SOURCE: Sridharan et al., 2019.

Figure 11 shows the climatic impact of these different wet or dry future scenarios on cassava production in Uganda. Graphic (b) shows the areas where cassava production is currently highest. In contrast, line (a) shows the amount of cassava production that can be expected

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in the wettest future climate scenario, and line (d) shows the amount of cassava production that can be expected in the driest future climate scenario; in these graphs, red and orange colors show negative percent changes in production while greens show positive percent changes in production.

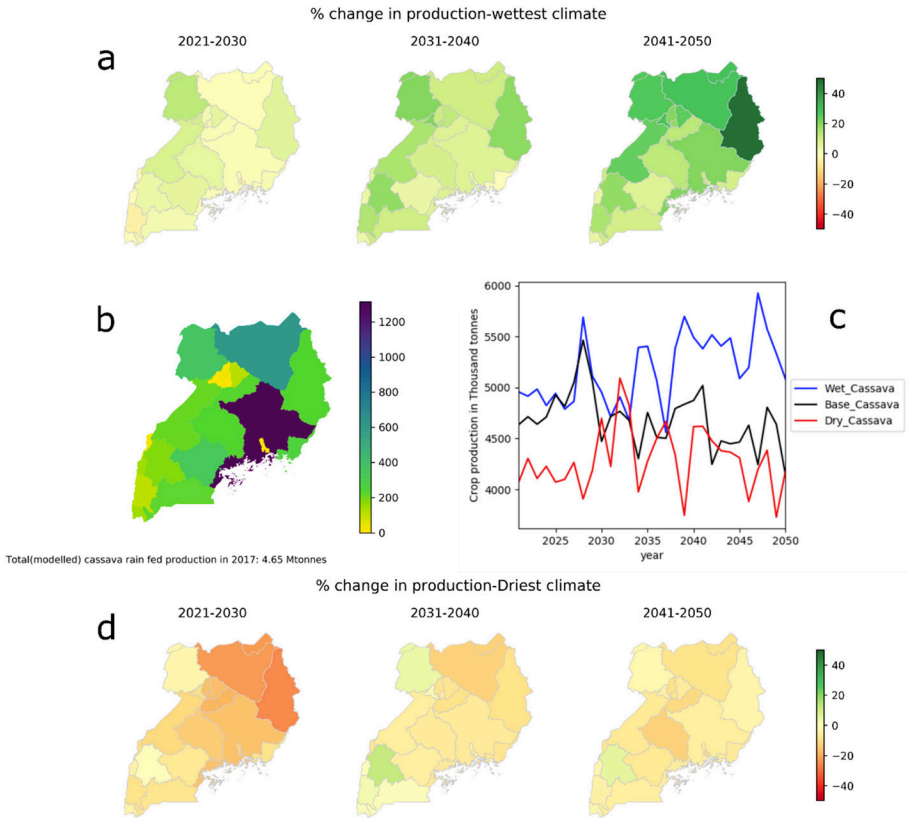


FIGURE 11 Climatic Impact on Cassava Production
SOURCE: Sridharan et al., 2019.

Water availability is a major limiting factor in crop productivity and agricultural yield that can be achieved in Uganda. Although the negative impacts of climate change are already set in motion, some efforts are being made and can be made to enable and prepare farmers to manage

these changes to their supply of crops and water. Locale-specific climate action is important due to the differences in the country. Water management and the strategic development of water catchment systems will be essential components of Uganda’s agricultural and sanitation adaptation plan in the coming years (Murphy & Kitamirike, 2019).

As a part of its strategic plan to promote equitable access to water resources, the Ministry of Water and Environment developed Catchment Management Plans (CMP) in 2011. CMPs in the water sector intend to ensure that water has a long-term strategy for sustainable development in Uganda. Within the CMP structure, water management is decentralized and left to the local catchments to manage (Ministry of Water and Environment). Catchment management programs can and should be developed at the local level, and this should be encouraged through governmental incentive programs. Incentives have also been explored to motivate greater community involvement in water management.

An example is the Water Towers project in the Elgon Mountain Region, where the Directorate of Water motivated communities by giving small “honoraria” tokens to community members who read gauges installed in rivers (CIFOR, 2018). The River Rwizi catchment system is another example of a heavily polluted river whose waters are essential for the health and livelihoods of communities. Restoration efforts anchored within the community are underway to preserve this river and ensure it continues providing its important ecological services (Mukombozi, 2022). These catchments are essential to relieve water stress; Figure 12 shows the distribution of water stress in Uganda in 2008 compared to the projected distribution in 2035, showing that many more regions will experience water stress in the coming years.

However, there are many other challenges besides water to developing a robust and sustainable agricultural sector that can provide sufficient resources for Uganda’s rapidly growing population. Entrenched poverty, and the reliance of food-insecure households and Uganda’s economy on rain-fed, subsistence agriculture in rural areas, leaves this sector vulnerable to any climate shocks; any limitations in this sector, such as changing precipitation rates, thus have large implications for food security across Uganda, and other regions of Eastern Africa (Nsubuga & Rautenbach, 2018; Okonya et al., 2013). Limited financial capital,

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poverty, low knowledge sharing, low educational attainment, and limited governmental support further impact the adaptive capacity of this sector (Twecan et al., 2022). Thus, building climate resilience at the household level for mechanisms to respond to climatic shocks and changes in agricultural production will be necessary to ensure population health (Hisali et al., 2011).

The agricultural sector in Uganda is responsible for employing 80% of the labor force and supplying 85% of exports (UNFCC, 2023). This sector is also responsible for over 40% of the GDP, although this entire sector is extremely vulnerable to drought conditions as anything planted is primarily rain-fed (UNFCC, 2023). Many individuals relying on the agricultural sector have already had to adapt in some way, diversifying their livelihood, raising cattle, entering the fishing industry, or migrating to a new area to accommodate environmental stressors (Afifi et al., 2012). Thus, ensuring farmers and citizens have as many resources to adapt to climate change is another essential component of Uganda's future development plans. Through the lens of community ownership, farmers currently have little control over the future of their craft if there is a lack of knowledge sharing and awareness in this sector.

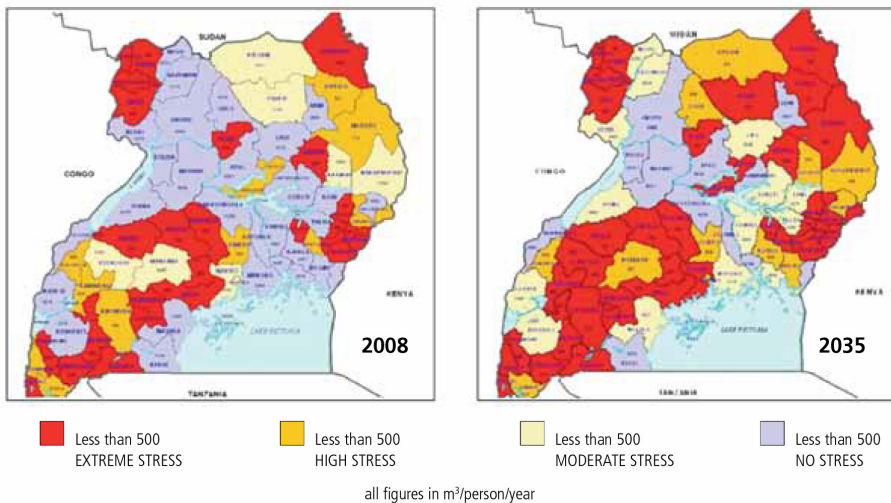


FIGURE 12 Distribution of Water Stress in Uganda, 2008 and Projected for 2035
SOURCE: World Bank, 2021

Currently, agricultural yield within Uganda has not yet exhausted its resources, as according to the World Food Program (WFP), Uganda still produces an excess of food compared to the amount consumed by its citizens (WFP 2022). However, certain regions, especially in the northern and eastern parts of the country, still struggle with food access. Given the sensitivity of Uganda's agricultural sector to temperature and precipitation shifts, the associated devastating impacts resulting from decreased crop yields, and the intense dependence on agriculture for the entirety of Uganda's population, it is essential for climate mitigation efforts to be implemented, focusing on maximum sustainability and through a lens of community engagement and ownership. In order to promote country ownership in this sector, change is needed in terms of pushing for agricultural reform and decision-making mechanisms that reflect the values and needs of Ugandans.

IMPLEMENTATION OF EQUITABLE CLIMATE MITIGATION STRATEGIES

Agriculture, forestry, and other land use are the largest contributors to global greenhouse gas emissions. Thus, any increased capacity in these sectors must be balanced with climate mitigation strategies. In Uganda specifically, ecosystem-generated capital such as those from land use for growing crops, raising livestock, and sustaining the forestry industry, as well as Uganda's dependence on external resources for health services, are drivers in the country's sensitivity to climatic changes (Notre Dame Global Adaptation Initiative, 2023). Populations living in geographically-risky environments hold a higher level of exposure and sensitivity to climate implications, such as those living in slums, rural and secluded populations, and those living in densely populated urban settings (Notre Dame Global Adaptation Initiative, 2023). Individuals living in urban slums and informal settlements may be exposed to weather extremes exacerbated by climate change, especially in regions with limited access to goods and services that can reduce climate stressors such as extreme temperatures and flooding.

Thus, it is important to remember the aspect of the hearts and minds of Ugandans when formulating any climate change strategy. This journey must begin with a full understanding of the individual position around climate change, including how it impacts the daily lives of Ugandans and how they understand it to impact their future. Writing policy and creating a strategy that addresses the immediate impact of climate change on everyday life will be the most effective in creating community ownership and organizing individuals around centralized climate change efforts. Climate change needs to be translated from an abstract idea to an actionable set of goals at the community level, which is a challenge for national-level externally driven climate actions.

Governmental policies on a large scale can and do sprout smaller, community-focused, and risk-focused climate change interventions.

Uganda has boosted many examples of this, and interventions that have proven effective and sustainable have a strong community component. In northern Uganda, specifically the Lira district, efforts have been organized around tree and grass planting and implementing energy-saving technologies. A large-scale project in the northern regions of Uganda was the Climate-Smart Agriculture Support Project. This project ended in 2020 and boosted agricultural productivity (World Bank, 2023). The project also focused on providing aid in times of emergency and working with the selected communities on climate adaptation strategies.

CASE STUDY 3

Leveraging African Voices to Improve Public Awareness

Although many individuals in Africa are already being affected by the devastating effects of climate change, many African voices are lost in the debate on possible climate action and little is being done to collect information on how African citizens perceive and react to these changes. Utilizing African voices to present information is essential to increase public awareness and promote trust and uptake of recommended action by community members. Gathering these stories is essential to promote community engagement and comprehension by African audiences.

As one woman from Soroti, Uganda stated, *“When it does rain now, it rains too much, it destroys crops and they do not grow properly and so hunger comes up.”* A man from Kampala stated, *“There were always places on the shores of Lake Victoria that were known for being like deserts, but these days the desert-like environment is almost all over.”* (BBC World Service Trust 2010).

Gathering these types of anecdotes is essential to understand what challenges communities are facing. Stories directly from community members are also important for promoting community engagement and comprehension by African audiences when trying to stress the importance of transitioning to more sustainable practices.

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Renewable energy solutions, tree growing, sustainable options for cooking stoves, a transition to solar for lighting, and a focus on sustainable practices for land and soil management are all areas of focus in the Kasese District. While reflecting on the work in this district, the Natural Resources Officer, Joseph Katswera, said, “Our homestead solar system coverage is now at 28.9%,” he said. “In 2012, we were at 3%. I think we have made strides. Equally, for the improved energy-saving cook stoves, we are at around 26.7% (IBRD-IDA 2019). ”

In terms of perceiving climate change and how it is discussed, institutions out to rally communities around climate change should refer to it in the way that communities refer to it, less in terms of ‘climate change’ and more in terms of weather changing. Some key questions which should be analyzed when creating communication strategies around climate change in Uganda are as follows – What are the changes Ugandans have experienced in their climate and environment in their lifetime? How do they respond to these changes in terms of their everyday actions? How do they explain these changes? What is known and understood about climate change? Regarding leaders, what are the conversations being had at the local leadership levels, and how is this influencing communication campaigns? What are the leader’s views on climate change? (BBC World Service Trust 2010).

The flow of this two-way conversation begins at the government level, with NGOs, and with large-scale media. It trickles down layer by layer in each sector, ultimately reaching the individual level. At this level, it can permeate conversations amongst families and communities, sharing knowledge and ideas. These ideas and perspectives can then be fed back through the same feedback loop, helping to raise awareness of the specific needs at the local level and making the voices of communities heard. Only at the local level can the context of what individuals are experiencing in terms of climate outcomes be adequately captured. This context must remain authentic as it travels back to local leaders for action.

Another essential element of successful and equitable climate mitigation strategies will be prioritizing the transition to a circular economy. Especially given the enormous amounts of resources and natural capital that are currently being extracted and depleted around

the world, implementing a system that focuses on developing a locally-driven and decentralized system of recycling waste materials back into the supply chain is known as the circular economy (Pandey et al., 2018). Efforts to promote a circular economy have been seen across the Global South. This model can be used to manage plastic waste locally (Pandey et al., 2018) or by promoting the development of sustainable sanitation systems and supporting the conservation of natural habitats by constructing wetlands (Masoud et al., 2022). One such project that has been implemented across Uganda is the creation of constructed wetlands or restoration of existing wetlands to treat wastewater, which will not only improve sanitation efforts and protect human health but also provide a water source for agriculture in a world where water is rapidly becoming a limiting factor in the agricultural capacity of many regions (Masoud et al., 2022; UNDP, n.d).

The Lake Nabugabo wetland system Ramsar site and the Bigodi Wetland Sanctuary are important to consider because these projects adopted a participatory, community-based natural resource management program wherein the community was consulted and played a large role in the design and implementation of the project (MWE, 2017.; Gosling et al., 2017). In the Bigodi Wetland Sanctuary, it was found that the wetland provided a large percentage of household income and resources for the families living around the wetland, and many of the residents perceived the wetland as being an important part of their livelihoods (Gosling et al., 2017). More participatory and decentralized projects like this are necessary to promote the capacity of local communities and governments to provide for themselves.

In November of 2021, 1214 individuals completed surveys, 102 of whom were also interviewed, and 12 focus groups were held with young people in Uganda on climate change (Barford et al., 2021). The main themes reported out on climate change by those interviewed were around the disruption of their livelihoods, particularly in the agricultural sector, climate-driven loss and displacement (whether it be their crops, their livestock, raw materials, or a driving need to move to survive), mental health and well-being, 64% reporting anxiety around the impending outcomes of climate change, and adaptation and mitigation. Half of those surveyed felt they needed more power or resources to adapt to

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climate change (Barford et al., 2021). This study resulted in four main messages to the COP26, which are as follows:

1. Education must be prioritized and should emphasize environmental education, climate change, and adaptation strategies.
2. Training is needed to provide young people with new functional skills for alternative, climate-resilient livelihoods, focusing on green jobs.
3. Young people need external support to access stable income sources and livelihoods, as well as financial programs and incentives that enable them to engage in climate mitigation strategies actively.
4. Inclusive dialogues at the national and international levels that engage young people and validate their experiences, expertise, and solutions are essential to delivering effective change.

The plans and actions listed above form Uganda's climate change policy framework and emphasize the need for a concerted effort to be made at the national level to ensure the implementation of successful and equitable climate mitigation strategies.

Country ownership and participation are thus essential for programmatic success and the development of a robust climate action plan in Uganda. Especially given that Uganda is one of the countries contributing the least to climate-changing emissions, promoting country ownership will be essential for in-country control of climate mitigation policies. Furthermore, with the huge threat climate change poses to Uganda's economic security and sociocultural development, it is essential that all development plans are country-driven; this ensures that Uganda's unique country context is accounted for and the most vulnerable are identified and supported across mitigation efforts.

Livelihoods-Based Climate Action

Community ownership strategies around climate change must originate from understanding the community's perception and understanding of climate change. Several learnings from the Berrang-Ford case study (see Case Study 7) on the Batwa people should be included when determining the approach to protecting the most vulnerable of the vulnerable in Uganda. Berrang-Ford et al. (2012) define the "vulnerability deficit" as the risk the "most vulnerable of the vulnerable" bear when it comes to feeling the impact of climate change in their communities. Understanding and leveraging the governance of indigenous communities and their level of dependence on and relationship with development organizations and external governmental organizations will allow for a more harmonized approach in ascertaining the community's level of knowledge around climate change and how interventions and support can be implemented.

Resilience building around climate change cannot begin if those who need it most are not recognized as participants in the efforts. A baseline understanding of the risks will drive community ownership success. For example, suppose those living in areas of high climate hazards, such as regions with a high potential for frequent flooding, are unaware of this. In that case, they may attempt to settle their families and livelihoods in these areas. Awareness of climate change risk will also impact behavior. The behavior will be driven by how much those at risk can control their settlement patterns and livelihoods. Expectation building and education is also a core part of risk awareness. Expectations of what is to come can equip individuals with a better ability to cope with the changes that climate change will inevitably bring to their lives. One study found that perception of risk was observed to vary according to the individual's socioeconomic status (Twinomuhang et al., 2021).

Marriage, gender, class, education, exposure to the natural world, and livelihood were all shown to produce differences in risk perception (Twinomuhang et al., 2021). Access to and effective interaction with the residents of the informal settlements of Kampala in this study brought forth several approaches that should be carried forward to harness all voices in the fight for life in a period of rapid climate change. The households chosen for the interviews were in the slums and areas

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particularly susceptible to flooding. The head of each household or the most senior member was interviewed in an open-ended and closed-ended questioning style . In addition to the questions, the household's basic socio-demographics and economic characteristics were collected. The information collected for the interviewee, consisted of their knowledge of the effects of climate change, information on both exposure and sensitivity to climate change impacts, and the collection of information to formulate an assessment of the household's and community's adaptive capacity. The focus groups were held in a gender-disaggregated format, making the differences in perceptions and understanding by gender more distinct. For the key informant interviews, the selected participants were subject matter experts in their respective fields, such as political and community leaders and NGO/CBO staff working in tangential fields to environmental and climate change work and the Kampala Capital City Authority.

Community ownership strategies can also be determined by the community's natural ability to support one another toward a common goal. Assessment of a community's preparedness can be ascertained by asking specific questions, such as how the community plans to get enough insecticide-treated nets for all of its members or whether there is a strong reliance on outside help rather than a community default to procuring the needs of their members independently. Socioeconomic sensitivity should also be considered before defining drivers and interventions related to climate change. After exposure to a health risk, determining the ultimate impact of the exposure is determined by the socioeconomic status of the community. The status can be measured at an individual and community level.

The World Bank reports on many productive climate change interventions over the last decade in Uganda. In addition to the transitional efforts around solar-focused energy sources and the move away from wood-based energy sources across the country, Uganda began the Uganda Clean Cooking Supply Chain Expansion project in 2016. The World Bank reports on the intent of this work as to eliminate the negative outcomes of utilizing solid biomass fuels, thus contributing to a better environmental and economic state for the communities who participated. Targeted geographically-based efforts and efforts to

impact specific communities, such as the Lake Victoria Environmental Management Project, have accompanied the broader-sweeping efforts. The Lake Victoria project has reduced pollution, increased climate resilience, and has had a transboundary impact, reaching many East African communities. The pastoral community has been and should continue to be a main area of focus for climate change adaptation and resilience efforts. Valley tanks and community-based boreholes have been bolstered by the Uganda Regional Pastoral Livelihood Resilience Project (2013) to reduce the effects of drought on livestock by utilizing sustainable water-holding strategies. (IBRD-IDA 2019).

Other initiatives developed to respond to climate change to increase resilience and provide sustainable livelihood sources to communities include developing alternative agricultural practices that can be incorporated into smallholder systems. Climate-smart agriculture is one method that focuses on reducing carbon emissions while promoting productivity and resilience within food systems (Codur & Watson, 2018). Regenerative agriculture also seeks to improve production by improving soil quality and promoting natural ecosystem processes without manufactured materials; this method requires reshaping the current agricultural systems in many regions but reduces the costs associated with fertilization and irrigation (Codur & Watson, 2018). Regenerative and climate-smart agriculture also are essential in decentralizing initiatives to promote community resilience, supporting lower-level governments and communities to take the lead in environmental programs and livelihood initiatives. In contrast, the centralized government takes a background role of technical backstopping.

CASE STUDY 4

Regenerative Agricultural Practices to Improve Climate Resilience

In Mbarara, the Sub-Saharan Africa Challenge Program supported farmers in Ntungamo district in further developing organic agricultural practices that do not rely on the use of artificial fertilizers or pesticides (Kalibwani, n.d.).

Utilizing the Songhai model, which was first introduced in West Africa, smallholder farmers in Uganda can use zero-waste and regenerative agricultural practices to promote utilizing the waste products from one sector to fuel other aspects of the system (Cohan, 2020). Beyond increasing food security, this initiative promotes a green and inclusive economy by providing sustainable jobs.

The Okere Shea Cooperative Society is dedicated to promoting afforestation and agroforestry efforts through the planting and protection shea trees in Okere (Saabwe, 2022). This can be used as a method to reduce biodiversity loss and increase sustainable livelihoods for Ugandans, focusing mainly on the most vulnerable communities.

Reforestation efforts in Karamoja seeks to reconnect communities with the natural environment by promoting a sense of community stewardship in caring for cashew trees, positively impacting not only the environment, but also improving community cohesion, climate resilience, and alternative livelihoods (Oyel, 2023).

Climate Finance as an Adaptation Strategy

Historically, international development financing inflows have not shown high levels of success in funding energy in SSA. Additionally, there is a high potential for corruption in government funding, resulting in projects that support the expansion of *existing* large-scale energy grids (Butu et al., 2021). The expansion of existing large-scale energy grids is not conducive to the end goal of providing the public with accessible and affordable energy sources. Another challenge has been a lack of vital data from institutions such as The World Bank. Baseline and monitoring data are not available to create the ability to measure the impact of energy access progress. A more pronounced lack of data

in rural areas perpetuates the energy access gap in these areas, as urban areas have historically received higher prioritization in gaining access to energy.

Climate finance can and will play a large role in the ability of local communities in Uganda to prepare for and enact mitigation and adaptation strategies. It is common and the norm in Uganda and surrounding nations that climate funding be given to national-level and multilateral organizations. This would not be so urgent without easier access to these funds for local-level organizations (CARE, 2020; Colenbrander et al., 2017). However, in the current state, the inequities that are at times perpetuated by these national-level or multilateral organizations when distributing funding in most sectors will also be applied to climate adaptation efforts. The funding and resourcing awarded to these high-level entities will result in more effective, expedient, and realistic strategies if local communities have a high level of touch and input on strategic direction. Furthermore, empowering communities to have a say in their futures, climate change-focused or otherwise, takes resources in hand. Vulnerable populations should be leveraged in the future of these funds.

Overcoming these challenges from a financial standpoint is something that different countries and governments within sub-Saharan Africa have taken various approaches around. Community engagement in financing accessible energy can be carried out through community-based organizations and entities within them, such as Rotating and Accumulating Savings and Credit Associations (ROSCAs). ROSCAs have a long-running record of quick loan approval and high levels of loan recovery, are trusted due to their longevity, and provide flexibility in obtaining and repayment that banks do not offer. Unbanked and generally underserved farmers suffer from a lack of security in the longevity of their business due to a lack of financial services. There are innovative technological resources available to these farmers, such as FarmDrive, which can provide financial services while working with financial institutions to increase their agricultural loan portfolios (FarmDrive n.d.).

The United Nations Environment Program summarizes climate finance as critical to impacting climate change as significant changes

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will require large-scale investments geared towards reducing emissions (UNEP, 2017). Sustainable and strategic climate financing mechanisms will be an essential part of any climate mitigation plan, both for these investments also for supporting societies and diverse economic sectors as they adapt to the negative impacts of climate change (Bakika et al., 2020). In Uganda, climate finance will also be needed for adaptation as the environment begins to affect livelihoods, health status, and access to resources. Generally speaking, climate finance includes sources of funding at the local, national, or transnational level obtained from public or private sources (UNEP, 2017). Especially given that many development pathways in Uganda have historically been characterized by power imbalances within finance mechanisms and donor-driven agenda setting, Uganda needs to take ownership of its climate financing structures to promote community-based interests.

A Climate Finance Unit (CFU) was established in 2022 by the Ministry of Finance, Planning, and Economic Development (MoFPED), and the Uganda Development Bank (UDB) also launched its climate financing facility in 2023. The MoFPED partnered with the British High Commission, the Commonwealth and Development Office, and the Global Green Growth Institute to create the CFU. The CFU will allow the MoFPED to mobilize climate finance in a way that will benefit the climate preparedness efforts within the country in a multifactorial manner. The CFU is its department within the MoFPED and manages, domestically and internationally, climate finance issues. These issues can be related to mobilization, monitoring and evaluation, reporting, and utilization. The CFU will have the designated capacity to ensure that necessary stakeholders are involved in climate change efforts. The CFU will focus on increasing access to and delegation of climate change funding. The CFU will also contribute to Uganda's goal around the Nationally Determined Contribution (NDC) commitment, as renewed in September of 2022. This commitment pledges a mitigation target of a 24.7% reduction below the Business-as-Usual Scenario by 2030 (GGGI, 2022). These efforts are estimated to cost about 28.1 billion (USD), and the CFU will oversee the associated efforts, to be split by domestic financing and external inputs (GGGI, 2022). The creation of a CFU in Uganda can help support communities more tailored and individualistic

based on their needs. The CFU will enable expedient mobilization of funds when needed and allow for more directed distribution towards the most pressing climate needs.

The Ugandan Development Bank (UDB) also developed a Climate Finance Facility prioritizing the development of a green economy and mobilizing green finance to help smallholder farmers and rural Ugandans withstand financial shocks that result from environmental changes (UDB, n.d.). Another such climate finance mechanism resulted from the partnership between Financial Sector Deepening (FSD) Uganda and Bidhaa Sasa, a Kenyan finance company, who together launched a campaign to develop climate financing in Uganda, increasing the capacity and social capital of women in both the domestic and financial sphere. The Bidhaa Sasa business model provides credit to women and families to promote the purchase of climate-friendly technologies, such as energy-efficient cookstoves and climate-smart agricultural tools, utilizing a unique approach to provide access to these financing mechanisms to rural or low-income individuals (Lutwama and Karugonjo, 2023). These climate adaptation finance mechanisms influence the consumption of tools and technologies designed to impact the drivers of climate change while improving human health and are essential to fostering sustainable growth.

In addition to these domestically based climate finance efforts, the CFU will play a key role in the pilot program Uganda is participating in for the UK COP 26 Presidency Taskforce on Access to Climate Finance. Fortunately, alignment around community ownership is baked into the task force's key principles. The task force will guide the CFU around initiative funding decisions, resources, and partnerships. Efficiency in directing funding and the intentional process behind the direction will also benefit involvement with the task force. The task force's principles are as follows:

- Principle 1 – Country ownership: Programs and projects will be owned and driven by recipient governments and the communities they intend to benefit, with national priorities framing providers' support.

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- Principle 2 – Harmonization of processes and alignment of finance to national plans: Processes associated with every stage of accessing climate finance will be streamlined and coordinated to offer a more strategic, coherent, and efficient approach for recipients.
- Principle 3 – Responsiveness to country needs and Climate Vulnerability: Climate finance will respond to the self-defined needs and priorities.
- Principle 4 – Flexibility and innovation: Adopt more innovative and agile approaches alongside proportionate risk management processes to deliver climate finance that responds to local capacity and needs variations.
- Principle 5 – Transparency and accountability: Climate finance should be more predictable, transparent and yield measurable progress towards recipient countries’ climate capabilities and goals.

Based on the evidence in this and the preceding section, the Committee concludes the following:

1. Financing for community climate action is still limited.
2. Current national financing mechanisms mark a significant step towards increasing financing to drive community-level climate change adaptation.

Based on these conclusions, the Committee recommends the following:

1. Local community banking systems should provide financial inclusion options for community-level action through blended financing beyond debt and equity, green bonds, and swapping debt for climate financing.
2. Through the Ministry of Finance, Planning, and Economic Development, the Government of Uganda should tap into

innovative financing for climate action by mobilizing crowdfunding from the diaspora.

3. Insurance companies should implement risk transfer mechanisms that provide forecast-based financing and compensation for climate adaptation and mitigation.
4. The Ministry of Water and Environment should lobby to increase performance-based resilience and adaptation financing to motivate districts to plan for climate action and promote ownership.
5. The Government of Uganda should put in place payouts for conserving ecosystem services and biodiversity.
6. The Government of Uganda should domesticate global climate adaptation guidelines to ensure communities undertake projects that promote climate action, such as tree planting for carbon capture.
7. The Government of Uganda should put financial policies and regulations that direct private finance away from high-carbon investments towards more green investments to promote climate action.

VULNERABLE COMMUNITIES AND CLIMATE CHANGE

Given Uganda's unique context, it becomes clear that external decision-making mechanisms are not appropriate and that the development of targets and plans related to climate change needs to come from within Uganda's borders. Overall, Uganda has ample space to leverage its natural resources, promote the voices of Ugandan scholars, scientists, and leaders, learn from indigenous practices promoting sustainability and responsible land stewardship, operationalize climate mitigation strategies, and emphasize accountability in governmental and financial institutions in order to support the development of country ownership and climate resilience within Uganda. Thus, especially when discussing country ownership, special attention must be made to mechanisms that can increase climate resilience and leverage community participation, especially among vulnerable populations.

For many vulnerable populations, mitigation and adaptation strategies are essential to prioritize nationally and locally. Current policies and strategies to combat climate change focus on mitigation strategies, which actively work to reduce the negative effects of climate change; however, many vulnerable communities may not be the main actors involved in developing such strategies or have the capacity to wait for future benefits (Martens et al., , 2009). Adopting renewable energies, developing climate-smart infrastructure, and stabilizing greenhouse gas emissions may be strategies that can be taken at a national level; it is then possible to promote these strategies through climate finance mechanisms such as those already discussed. Individual-level mitigation strategies are possible, but since many of the most vulnerable individuals are not the main contributors to climate change, developing blanket recommendations to limit greenhouse gasses may have unintended consequences.

However, while some nations must make and adhere to large-scale national and international policies, individual-level behaviors are also an essential component of combating climate change. The challenge is that, as discussed, individual-level contributions to climate change are unequal, so creating global caps on emissions and emphasizing personal responsibility may burden some individuals much more than others. As Andreas Malm discussed in his 2021 book, “If a peasant family in India uses coal to cook their food or light up their house with electricity from a coal-fired power plant, the only available alternative might be no stove and no lamp. Because they are locked in a fossil economy, they have little choice but to use the CO₂-emitting energy on offer... Subsistence emissions occur...in the absence of feasible alternatives.” This echoes a discussion by Vanderheiden (2012), who asserts that such subsistence emissions should never be restricted so that luxury emissions, which go beyond the basic emissions needed for survival, can continue. The imperative, then, is to create systems that allow individuals to thrive and sustain themselves while simultaneously limiting the pollutants and emissions causing the climate crisis.

Minority Populations and Climate Change

Ethnic minorities and the urban poor in Kampala and other cities in Uganda are deeply affected by climate change due to the associated monetary constraints, which leaves them with little control over their adaptive capacity and exposure to climate change. Basic services providing clean water, energy, sanitation, and passable roads are not guaranteed in the informal settlements where the urban poor reside. The infrastructure projects and city-led efforts to prepare for and combat climate change must therefore make a point to include the populations living in informal settings. The exclusion of these groups will harm increasing social cohesion and country ownership in Uganda. Community ownership means inclusion, and without the participation of the estimated 60% of Kampala city who live in slums, there can be no true concept of community ownership or progress (Renzaho et al., 2020).

In a study by Twinomuhangi et al. (2021), the perceptions of the urban poor around climate change were collected and studied; these

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perceptions and understanding of climate change within vulnerable populations are vitally important for community ownership. If climate change is not perceived as a threat, the community is less inclined to take meaningful action against it. This study was completed in informal settlements in Kampala, and the interviews were completed in group discussion and key informant style. The study also looked at the vulnerability level and drivers of Ugandans living below the poverty line. Urban settings across Eastern Africa are vulnerable to the climate crisis as they will be impacted by the urban heat island effect, heat waves, floods, and droughts (Twinomuhangi et al., 2021). Kampala city is no different. Within Kampala city, the urban poor community feels the effects of a lack of needed food, water, transportation options, and energy, even without consideration of the implications of climate change.

Another community that experiences increased vulnerability to climate change is individuals with disabilities. Although Uganda's National Policy for Disaster Preparedness and Management included stipulations on the need to emphasize special considerations for individuals with disabilities, one study investigating landslide risk found that individuals with disabilities are at high risk due to increased exposure to natural disasters and challenges with social capital and socioeconomic resilience (Ssennoga et al., 2022). Individuals with disabilities also experience low adaptive capacity for climate change due to energy and water scarcity and food insecurity (Nyasimi et al., 2017). However, individuals with disabilities possess valuable knowledge and skills that are essential for the development of a cohesive community; thus, ensuring the health and well-being of neurodivergent individuals or individuals with physical, cognitive, or mental disabilities is necessary for the development of an equitable and sustainable development agenda.

Age and Climate Change

There is also an age component when evaluating vulnerability cycles and discussing the multiple dimensions of marginalization that can occur from climate change. Both children and older individuals experience high levels of institutional disenfranchisement and intersectional

vulnerabilities, which can co-occur with previously discussed vulnerabilities such as gender, socioeconomic status, possessing a disability, and being part of indigenous populations. Poverty within the indigenous Batwa communities drives disadvantages from the start in the lives of Batwa children, with most families living below the poverty line (Berrang-Ford et al., 2012). Younger individuals are also very vulnerable to environmental degradation from climate change, such as temperature, pollution, water quality, and food availability. In areas where children already experience high morbidity and mortality rates, which may be associated with and exacerbated by malnutrition, food insecurity, familial resource constraints, and low institutional healthcare capacity, more frequent exposures stemming from climate change, such as an increase in malaria-ridden mosquito vectors or water-borne diseases, will continue to affect children disproportionately. When the children in a community cannot get ahead of the health risks in that community, society suffers. Healthy, safe, and able youth lead to thriving adults. These studies highlight the importance of capturing and learning from the voices of those most affected by climate change outcomes. These studies also demonstrate that those most impacted by climate change are already very much aware of the impact climate change has and will have on them and their households, livelihoods, and communities but are often not able to take actions to address it.

However, young people in Uganda can serve as a key leverage point in escalating the community's voice around climate change. Uganda is a uniquely young country. More than 75% of the country's population is less than 35 years old, a percentage that is expected to double within 25 years (UNICEF U-Report). The damaging outcomes of climate change threaten the socioeconomic status of young people in Uganda. Figure 13 shows Uganda's population graph by age, which predicts that, although the population continues to increase, Uganda is currently in the early transition phase of the demographic transition, where fertility rates will decline. The population as a whole will steadily become older. However, given that Uganda has such a young population, special care must be taken to ensure food security, provide sufficient resources and support the livelihoods of these individuals as they age.

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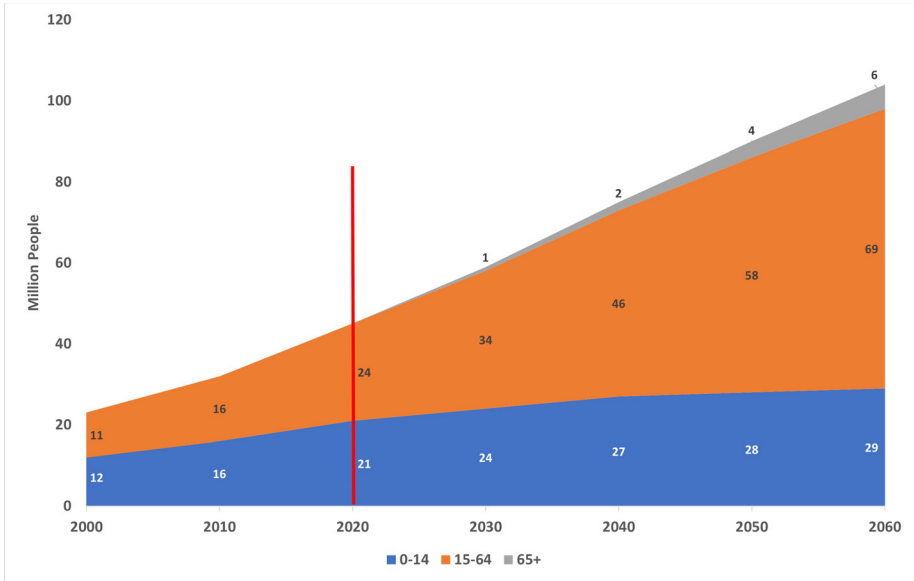


FIGURE 13 Uganda Population by Age Group
SOURCE: Myers et al., 2021.

On the topic of health, young people’s physical and mental well-being is at stake. Their livelihoods, access to education, access to food and water, and security regarding where to settle down are also major factors being threatened in the face of a climate crisis. The Youth Development Project is one initiative focusing on increasing youth capacity and securing the livelihoods of the next generation of farmers (Jacobs Foundation, n.d.). In Youth Farmer Field Schools, young people are provided with skills training in agricultural methods and financial literacy, simultaneously building social cohesion and providing tools for long-term financial security in a changing world.

Uganda’s young population has also long been essential to climate action. Youth Go Green is a youth-led organization dedicated to climate action and youth empowerment in Uganda and other African countries (Youth Go Green, 2022). By emphasizing youth capacity and capitalizing on this demographic by providing skills training and advocacy activities, this organization equips the next generation of Uganda’s leaders with the tools and knowledge they will need to

continue combatting the climate crisis. In response to the huge numbers of face masks that were discarded as mask mandates were lifted, youth in Kampala and Gulu organized a pilot for ‘Innovative Youth Engagement in Waste Management.’ Recycling the plastics from the masks and reusing the materials to make other products is an essential component of a circular economy, which will become increasingly more essential as a mitigation strategy in the future.

Older individuals also are affected by climate change in diverse ways. Older individuals are more at risk of deleterious health effects from exposure to environmental hazards and risks from climate change, such as heat stress and pollution (McQuaid et al., 2018). In some communities, older individuals may find it harder to diversify their livelihoods in response to economic shocks, affecting their adaptability to climate change (Oriangi et al., 2019). Additionally, in the agricultural field, while elders are often sought out for their experience and advice on weather and land use (Orlove et al., 2010), the physical nature of agricultural practices makes it difficult for elderly individuals to contribute to the labor workforce indefinitely. However, other studies have shown that older farmers are often wealthier and have more land than younger farmers; this may be because older farmers have more experience, which allows them to anticipate changes and use their local knowledge to develop and implement effective strategies to adapt to climatic changes (Cooper & Wheeler, 2017).

The generational differences in perceptions of environmental conservation are apparent in a study conducted with communities in Jinja, Uganda. There was a marked difference between the perception of older individuals who supported subsistence-based and sustainable practices that were enough to support a community and the perceived corruption and individualism of the current generation, who were seen to eschew environmental responsibilities and contribute to the erosion of traditional ways of life that depend on the health of the environment.

One theme that emerged was the differences in perception of nature between generations. As one 28-year-old from a community in Jinja said, “In my family, the generation that has considered the environment is that of my Jjaja’s [grandmother] because they always struggle to see that something they found there is still there. Take an example of the

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Mabira Forest; it was going to be destroyed so that Madhvani might plant sugar cane, but it is the old people who woke up and said, ‘No, you are not destroying this forest, we found it there and we want other generations to come and find it there, and also study about it’ ... In this generation, people are not patient, so they always want short-term things, and there is too much corruption in this generation.” Another 28-year-old female echoed , “People today, they love a lot of money. This generation doesn’t have the patience to leave the tree standing, but our parents, for them, they were respecting their [grandparents’] things, like they knew that if you plant a tree, you have like a fruit tree, you are supposed to have fruit but not [be] cutting it down ... In my village, the problem came about when people found out that you can get money for charcoal ... the generation now doesn’t prepare for future generations; they look at how so and so built a storeyed house, they want it, but they don’t prepare for their children.”

These studies highlight the importance of capturing and learning from the voices of those most affected by climate change outcomes. Often those most impacted by climate change are already very much aware of the impact climate change has and will have on them and their households, livelihoods, and communities, and possess critical knowledge to addressing the climate crisis, but may be in a disadvantaged position that limits their capacity to share this knowledge. Thus, an emphasis must be made on soliciting the thoughts and advice of individuals throughout the community, especially those most vulnerable and disenfranchised.

Gender and Climate Change

Women and children bear a large burden of risks related to climate change and, due to lower adaptive capacity and social capital, also have more barriers to implementing strategies for climate preparedness. In a study by (Twinomuhangi et al., 2021), the two most prominent predictors of climate change knowledge were the level of education and household ownership, both of which often exhibit gendered patterns. In this study, women reported a higher sensitivity to adverse health-related outcomes due to climate change, at 85.7%, compared to males at, 14.3%.

Similarly, a 2012 study by Kisauzi et al. found significant gendered differences in knowledge and awareness of climate change, with female-headed households in Uganda less likely to have correct climate knowledge. This finding was seconded in a study by Kyazze et al. (2012), which found that women often face restrictions on knowledge-seeking and may lack the ability to undertake certain adaptation strategies due to cultural constraints. Given the gendered gaps in education and information access in Uganda, climate interventions must take gender into account when developing any response. Another 2012 study by Chaudhury et al. similarly found that differences in adaptive capacity among men and women differed in Uganda, with implications for gender equity following projected climatic changes (Chaudhury et al., 2012). Additionally, female-headed households may experience more prevalent vulnerabilities than male-headed households due to decreased access to resources and economic opportunities that allow for adaptive capacity (Balikoowa et al., 2019; Mugeere et al., 2021). There are often significant gendered differences in land ownership in Uganda (see Fig. 14), which further places women at risk due to the limited availability of household resources and subsistence activities.

Women experience multiple unique vulnerabilities to climate change in Uganda. One 2012 study found that women in Uganda were less likely to effectively adapt to climate stressors, resulting from financial and social barriers that reduce adaptive capacity. However, these results changed depending on the sociocultural context (Nabikolo et al., 2012). When developing climate adaptation and mitigation strategies, it is essential to emphasize gender mainstreaming, especially given that women and children may often experience decreased access to resources, economic opportunities, and social capital to improve their adaptive capacity (Acosta et al., 2019). Younger households often had lower income levels and were forced to live in more flood-prone areas without resources to help protect their homes from flooding (Twinomuhang et al., 2021). Unsurprisingly and overwhelmingly, economic hardship increased the household's perceived vulnerability to climate change impact. Food insecurity, weak infrastructure, participation in the informal economy without formalized social services, and reliance on poorly-designed urban services were also the main drivers of climate change vulnerability.

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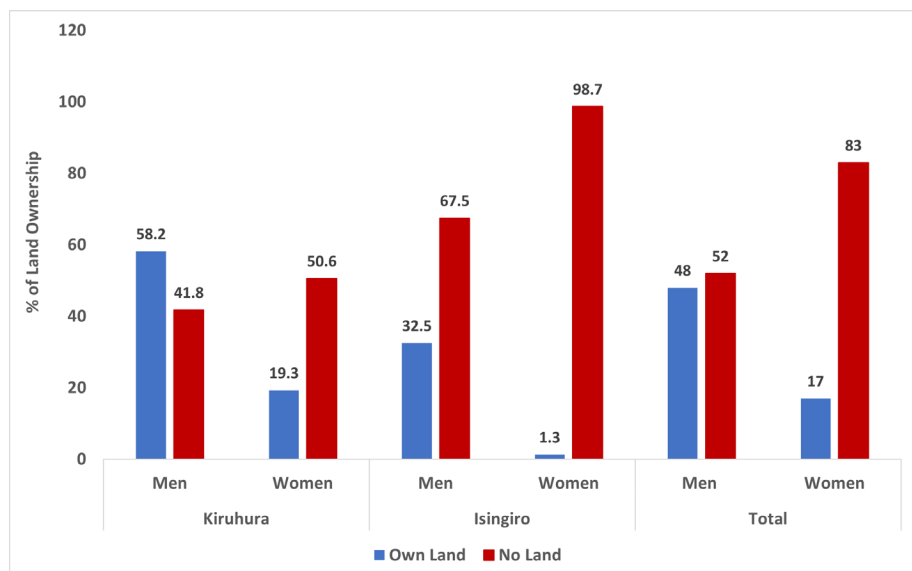


FIGURE 14 Land Ownership by Gender
SOURCE: Nagasha et al., 2019.

However, women are also focal points and drivers of climate action. One study found that women’s participation in natural resource governance was correlated with improved conservation and resource management outcomes and that women’s representation in the political sphere was correlated with adopting more comprehensive climate change policies (UN Women, 2022). Given that historically disenfranchised rural women make up a large part of Uganda’s agricultural sector, they are also able to drastically affect climate action and food security, as seen by a large number of women-led organizations and cooperatives dedicated to tackling climate change that exists across Uganda. One such community action is “Women’s Empowerment for Resilience and Adaptation Against Climate Change,” a collection of women-led associations in Uganda that pool their money to then borrow and invest in sustainable income-generating activities that are geared towards climate action, all while gaining economic independence (UN, n.d.). The Spotlight Initiative is another organization in Uganda that provides skill development and adult literacy programs, trains women in climate-

smart agricultural techniques, and works with an advocacy group to assist women with owning and managing their land (Spotlight Initiative, 2022).

Many organizations also promote women’s participation in climate action by providing them with the skills and knowledge necessary to train others within their community. One such example is the Osukuru United Women’s Network in Eastern Uganda, a locally-formed community group of women who responded to the floods in their area by taking action (Saabwe, 2023). Women in the group created a climate training center where community members can learn about climate change and teach others in their village about solutions to build resilience, such as regenerative agriculture practices, cleaner fuel sources, and sustainable water management techniques. It also incorporates indigenous knowledge and teachings into its resilience strategies to promote community ownership and sustainable conservation practices. This program also reduces domestic violence by promoting economic independence and self-reliance for women, especially those affected by domestic violence (Twahirwa, 2022). As Rose Wamalwa, the East Africa coordinator for Women’s Climate Centers International, said, “Globally, we know that women’s environmental leadership has proven time and again to be one of the greatest leverage points for increasing our collective environmental and climate resilience initiatives” (Derler & Climate Justice Resilience Fund., 2020). Women must participate in the development of mitigation and adaptation strategies. Especially given the importance of women in fostering community, climate action must be women-centered to develop gender-responsive, sustainable, and climate-smart communities that are resilient to climate change.

Based on the evidence in the section on gender and climate change, the Committee concludes the following:

1. Uganda is a signatory to several climate change treaties whose impact is not being felt. In addition, there are concerns about lock-in and dependency, which erodes community ownership.
2. Stratified gender vulnerabilities differ. Rural women, older persons,

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women and youth in urban settlements, displaced communities, and indigenous communities are at a higher risk of exposure and require specialized consideration.

Based on these conclusions, the Committee recommends the following:

1. The Climate Change Department at the Ministry of Water and Environment should translate existing laws and policies into guidelines and action plans to promote action at the community level.
2. Project designs at the community level should be participatory and inclusive to promote ownership and community action. In addition, the sustainable and judicious use of the environment and resources should be cognizant of community diversity .
3. Vulnerability assessments should be participatory, consider the stratified gender vulnerabilities, and be contextualized to target livelihoods that require specialized consideration.
4. Bottom-up innovations that evolve into national-level policies are crucial to support livelihoods and promote climate change action at the community level.
5. The Government of Uganda should domesticate climate change treaties to create space for community ownership and leadership that promotes action at the community level.
6. There is a need for cross-boundary collaboration in forestry, water, and land use management to promote community climate action.

Climate Refugees and Migrants

Another vulnerable group that deserves unique consideration when investigating the effects of climate change are migrants and climate refugees. Climate-induced rural out-migration and climate refugees have become increasingly common. Although many countries work to reduce their climate vulnerability and adopt adaptation and mitigation strategies, migration may continue to increase in prevalence, affecting

surrounding communities and increasing tensions in resource-constrained areas. Given Uganda's aforementioned lenient refugee policies and their relative stability and access to resources as compared to surrounding countries, it is likely that climate-induced migration, both internally and externally from Uganda, will only increase in the coming years. According to the World Bank, sub-Saharan Africa could see around 86 million climate migrants by 2050 (World Bank, 2021).

Agricultural yield and land availability also play a large role in Uganda's refugee policies and will be a critical theme considering Uganda's projected population growth. Uganda's population is rapidly expanding and is expected to reach 100 million by 2050; as of 2022, Uganda also hosts the world's third-largest refugee population (WFP, 2022). The rapidly increasing population and continued support and acceptance of refugees from surrounding countries strain Uganda's ability to achieve the Zero Hunger Sustainable Development Goal by 2050.

Additionally, given that Uganda and other East African countries are already experiencing negative effects related to climate change, coupled with Uganda's extant refugee population, it is probable that the already diminishing agricultural yields and strained national food supply will not be sufficient in the future. With the current rate of population growth and the large influx of refugees seen in recent years, there will not be enough land to house everyone, especially with additional livestock they may attempt to raise or instances of drought, soil infertility, or pests (Grosrenaud et al., 2021). Thus, investigating and investing in adaptation strategies that will support community resilience and coping methods are a must.

Furthermore, many refugee communities lack access to public services and energy, with some households spending almost 13% of their monthly income on energy expenditures (van Hove & Johnson, 2021). Uganda has been touted for its progressive and proactive stance toward refugee welfare and the many policies enacted to ensure social protection, the right to work, and access to refugee resources (Omata, 2022). However, care must be taken to ensure that sustainable structures are implemented to ensure the continued well-being of all who live within Uganda's borders.

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Indigenous Groups and Climate Change

The Batwa population in Uganda, a group of Central Africa's Pygmy population, experienced a significant upset to their traditional ways of life at the end of the 20th century when they were uprooted due to conservation efforts (Berrang-Ford et al., 2012). The resulting loss of traditional livelihoods caused by this population displacement, coupled with pre-existing low socioeconomic status and social marginalization, have made this population especially vulnerable to climate-related events, with a low adaptive capacity to deal with its effects. This uprooting forced the community to rethink their means of livelihood while simultaneously further contributing to their lower socioeconomic and health status in Uganda.

These communities and their health were negatively impacted by their forced removal from their original dwelling areas near the Bwindi Impenetrable Forest. They have been shown to suffer from health outcomes that are much more threatening than those of the average Ugandan, with 87% of women having lost at least one child and child mortality rates being close to 40% (Berrang-Ford et al., 2012). This is double the regional and country rate (Berrang-Ford et al 2012). The Batwa people also reported experiencing a disruption to their sense of belonging when forced to leave their forest-centered dwellings, as many of their cultural and spiritual habits were one with their lives in the forest (Berrang-Ford et al., 2012). Without a strong sense of belonging, there cannot be ownership. A successful community ownership strategy must consider vulnerable and historically marginalized communities.

The United Organization for Batwa Development in Uganda is a resource that could be utilized in creating and implementing climate change research and strategy responsive to vulnerable individuals' needs (Berrang-Ford et al., 2012). When conducting interviews and conversations to gain insight into the Batwa peoples' experiences, research efforts were found to be most effective when held in the native language of the community and through avoidance of the term 'climate change,' keeping the focus on the perception of how the environment impacts the community members' health (Berrang-Ford et al., 2012). Interviews were conducted via a technique called Rapid Rural Appraisal, consisting of five strategic approaches in learning

directly from the community members: asking individuals to answer research-based questions via a flexible conversation format, interviews by an individual with deep knowledge of health risks, hearing the Batwa peoples' predictions of certain future scenarios dedicated by the continuation climate change, and a genuine and observational focus on individual stories (Berrang-Ford et al., 2012). Photovoice was also used to learn from the communities; participants were given a camera and asked, "How does the environment affect your health?" They then had a few hours to capture images that reflected their answer. Debrief sessions were held with the participants to understand their points of view and the individual's description of the photo. Deriving strategies for developing country ownership based on evidence drawn from communities and emphasizing community participation will be essential to building internal capacity within Uganda.

REDUCING VULNERABILITIES AS AN ADAPTATION STRATEGY

Pre-emptive vulnerability reduction can be an essential adaptation strategy with implications for the sustainability of Uganda's urban centers and agricultural productivity. The need for pre-emptive vulnerability reduction is clear when looking at the drivers of rural out-migration or climate refugeism, which are often triggered by droughts or floods in rural areas that limit individual's ability to sustain themselves on agriculture, pushing people to come to the city looking for work. These adaptive strategies are becoming increasingly common as individuals migrate to urban centers or other countries to look for employment opportunities and to deal with environmental changes affecting their way of life in the areas where they live. One World Bank estimate predicts that Uganda's urban population will grow to around 20 million individuals by 2040 (Farley-Kiwanuka & Farley-Kiwanuka, 2020).

However, shifts in the agricultural workforce due individuals migrating away from rural areas have implications for food security, distribution, and production within Uganda (Brown, 2014). One framework contextualizing the nexus between climatic changes, socioeconomic vulnerabilities, livelihood decisions and migration is the Sustainable Livelihood Framework, which can inform development activities and promote sustainable growth within Uganda (Twinomuhangi et al., 2023).

Figure 15 shows the predicted increase in population growth through 2060, disaggregated by urban versus rural populations; this shows that by 2060, Uganda's urban population is expected to surpass the rural population, placing pressures on urban resources and land use.

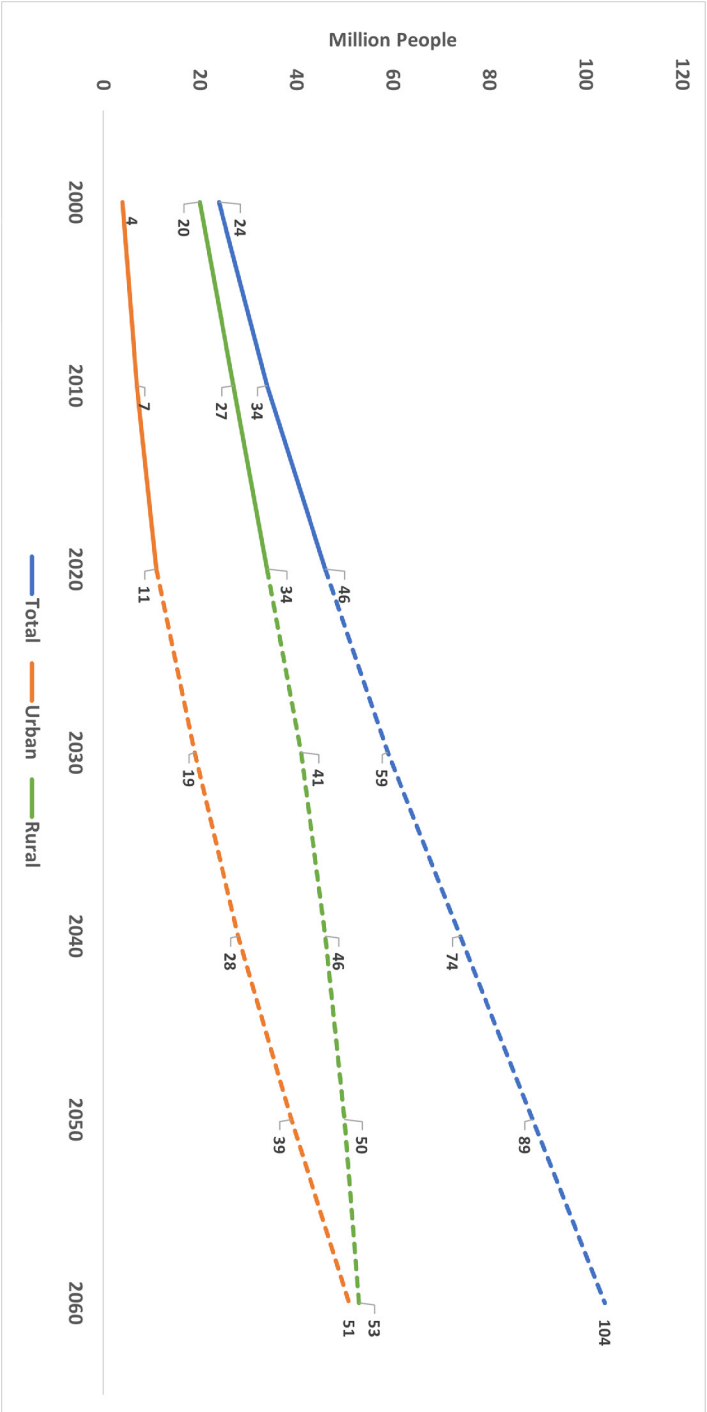


FIGURE 15 Uganda Population, Urban vs. Rural
 SOURCE: Myers et al., 2021.

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Projected population increases, and rural-urban migration due to climate change make sustainable urban development a necessity in today's world. Rural-urban migration due to climate change impacts or climate refugeeism results from the inability to grow crops, sustain an agricultural-based livelihood, and escape the impact of natural disasters. One 2020 study investigating 850 households in rural Uganda found that climate stress was one of the leading causes of urban migration and that such migration may be one aspect of diversified livelihood strategies in response to climate change; depending on the persistence of the climate stressor, this migration may be either temporary and seasonal or permanent (Call & Gray, 2020). Additionally, not only are migration patterns in Uganda influenced by the rapid or slow-onset of the climatic stress, but an individual's socioeconomic circumstances also drastically affect their hazard vulnerability and ability to cope (Berman et al., 2013). Many vulnerable individuals often lack the financial resources necessary to migrate away from climate stressors and are instead trapped in place (Gray & Wise, 2016). This concept of a poverty trap was also consistent with a 2011 study by Gray, who found that instances of migration in Uganda as a result of degradation of soil quality were consistent with the existence of a poverty trap that reduced the ability of individuals to migrate to more environmentally favorable conditions (Gray, 2011).

Kampala's population continues to increase yearly, mimicking the national trend. Rapid population growth has led to a youthful national demographic. Many urban areas experience high rates of urban migration of youth looking for economic opportunities. Therefore, it is essential to ensure that programmatic efforts consider this young demographic and their unique needs (Mugeere et al., 2021). Moreover, the urban poor who reside in informal settlements in Kampala and other cities in Uganda are often not considered a part of the 'city' and are therefore left out of strategic planning for protection (Twinomuhangi et al., 2021). The voices of the urban poor are not often leveraged enough. There is a need for more studies to harness the voices of this group and provide them the opportunity to speak, learn, and, ideally, be heard.

Health Care and Climate Change

Healthcare access also impacts migration and climate adaptation strategies in Uganda as individuals and families seeking healthcare services often migrate to areas where these services are more readily available. Developing sustainable strategies and integrating climate-smart technologies within this sector will be essential, as healthcare is heavily influenced by climate change and is already a limiting factor in many areas in Uganda, especially for rural communities. The ability to care for migrating communities in the wake of climate change in Uganda can be traced back to the strength of the health system and the availability of healthcare resources. Donor dependency, propelled by underfinancing and under-resourcing, impacts the availability of safe, quality, affordable, and equitable care.

Healthcare facilities in the public sector, and therefore those expected to serve the majority of Ugandans, particularly the historically excluded and underserved populations, often do not have the right staff or enough staff, lack adequate infrastructure, and are not geographically located where accessible (Scheerens et al., 2021). These are downstream effects of a lack of funding. As climate change continues to impact Uganda, health needs and populations requiring care will change. Climate-resilient health centers and approaches should be formulated to meet the needs of the populations.

Investing in healthcare technology and resources will enable the healthcare sector to overcome challenges that will be a byproduct of climate change over the next century. Additional investment in sanitation systems, climate-resilient housing, alternative energies, quality medical personnel, and sustained institutional capacity in the health sector should be bolstered. As the already sensitive health status of vulnerable populations in Uganda is impacted by climate change outcomes, human resources in the health sector will need to be available to care for these individuals. When considering climate finance and how these decisions will be made by the government of Uganda, as well as how these decisions may impact community-level ownership, imbalances in power in money will inevitably remain. This imbalance can lead to an ongoing cycle of inequity and the marinating impacts of disempowerment at the community level. When communities feel disempowered and see

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and understand that the source of this is corruption at higher levels, this reduces individual-level investment in national development and participation.

An intersectoral capacity-building approach can be taken to equip health sectors with the ability to care for migrating populations (Scheerens et al., 2021). The intersectoral approach includes disaster management, water and sanitation, food production, urban planning, and education. Primary healthcare providers can identify the needs of the community. At a community level, these providers can assess the pressing intersectional needs and can shape the strategy to care for the community. Although primary care is the first and most common interaction Ugandans will have with the health system, primary care providers are often left out of the discussions around climate change adaptation, mitigation, and care planning.

As discussed, as individuals around the world begin to battle climate change, it will be essential to embed mechanisms to ensure equitable access to mitigation measures and resilience strategies tailored for individual communities. Currently, most research on climate change conducted and adaptation measures taken are occurring in higher-income countries, which places other countries at a disadvantage as less is known about the populations and geographic regions most at risk of climatic changes. Therefore, it is essential that all countries promote community participation and engagement in the development of any adaptation strategy, further ensuring that vulnerable populations are given a voice and decision-making powers and that climate strategies are individually tailored to each country through the promotion of country ownership. Continued anthropogenic activities, including resource extraction, urban expansion, and greenhouse gas consumption, drive these climatic changes that perpetuate costly and lethal climate-induced disasters. Furthermore, some nations hesitate to take meaningful steps to combat climate change, which may require a massive overhaul of existing energy infrastructures. The continued failure of many countries to adopt and implement robust disaster risk management plans and climate adaptation strategies further leaves many citizens worldwide vulnerable to the physical, psychological, and financial consequences of climate change.

Health systems in Uganda, already under strain with the current pandemic, are further tested by addressing community health and providing healthcare in the context of climate-induced disasters, which can increase food, water, and energy insecurity, contribute to the spread of chronic and vector-borne diseases, amplify violent conflict, and contribute to DALYs related to injury and mental health burdens. When planning sustainable pandemic recovery, it is essential to simultaneously integrate steps towards sustainable and equitable climate mitigation, all grounded in a framework driven by principles of country ownership. The dual effects of climate change and the pandemic also aggravate global disparities with a compound effect. Worldwide disparities in the ability of countries to provide their citizens with vaccine access, healthcare, and social services during the pandemic highlighted the adaptive capacity of many countries to global shocks.

The COVID-19 pandemic has highlighted structural inequities ingrained in countries' health systems and social structures worldwide and aggravated global disparities. The societal, economic, and environmental inequities that were brought into relief by the pandemic are only compounded by climate change. The pandemic and climate change jeopardize the realization of the 2030 SDGs by slowing or reversing progress made in healthcare, gender equity, and education sectors, impacting public health service delivery and access, limiting resource availability, and stunting sustainable economic growth. In order to make meaningful progress towards the sustainable development goals by 2030, widespread economic changes, peacebuilding activities, and sustainable and inclusive policy mechanisms and infrastructure will need to be implemented globally, emphasizing global participation and community buy-in. The choices countries make in the near future regarding their commitment to climate mitigation and its nexus with health systems strengthening will have the potential to either reduce or further entrench these disparities, with global equity implications.

Climate-induced disasters and shocks such as tropical storms, wildfires, widespread crop failures, sea level rise, and much more will test countries' adaptive capacity in much the same way. Global inequities among indigenous peoples, gender and sexual minorities, ethnic minorities, low-income communities, housing-insecure

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individuals, women and children, and all other vulnerable groups are often unprotected by established social structures and have less ability to adapt to these types of social and economic shocks. In order to protect these vulnerable groups from the compounded adverse effects of climate-induced disasters and global pandemics, a concerted effort must be made to approach climate action through an equity lens.

However, the pandemic and the current climate crisis also provide numerous opportunities for Uganda and East Africa to seize and thrive. Building back stronger from the pandemic, with green principles in mind and capitalizing on the sense of community that has been fostered through the collective action of living through a pandemic, sets Uganda up well for sustained development and growth.

Given the still-emerging state of Uganda's urban and energy infrastructure, focusing on future growth and investment while keeping equitable and sustainable principles in mind will allow for an easy transition to more climate-friendly and climate-resilient structures and policies. Emphasizing community participation and engagement of vulnerable groups will allow for a more just and equitable transition that will unite Ugandans and make the country stronger. Promoting multi-sectoral engagement and principles of country ownership, not relying on external donors, will strengthen Uganda's economy and sociopolitical environment. Breaking these colonial holdovers that perpetuate power imbalances and reinforce pre-existing hierarchies will be critical for Uganda's future growth. How the Ugandan government responds to the climate crisis and post-pandemic socioeconomic development will have vast implications for institutional trust by Ugandan citizens and Uganda's evolution as a whole.

Developing Sustainable Cities within an African Context

One essential component of reducing vulnerabilities has to do with developing climate-smart cities that will not only enhance equity and the ability of communities to cope with the negative effects of climate change but also be directly involved in the reduction of climate change. According to Echendu and Okafor (2021), a climate-smart city is "an all-encompassing urban management archetype that advances

control and efficiency, facilitates participation, and promotes inclusion through leveraging and utilizing modern technologies to achieve better functioning and sustainability for all residents.” Like Uganda’s energy infrastructure, taking care of urban planning and development could be essential to reducing Uganda’s reliance on fossil fuels and imports and improving its inhabitants’ quality of life and sustainable urban growth. Kampala was one of the pilot cities for UN-Habitat’s Cities and Climate Change Initiative, which found the need to identify strategic entry points to developing climate policies essential in areas like Kampala, which, being an inland city, may not face the immediate effects of climate change (Bulkeley & Tuts, 2013).

Mwesigwa and Mubangizi, in their 2018 paper, further find that the development of smart urban centers that focus on climate change and sustainability is essential. However, they recognize the need for tailoring the development of any such urban zone to the particular context and citizenry of the urban zone. Similar to previous discussions on energy infrastructure, the current state of development of African nations provides them with a unique opportunity to invest in the development of climate-smart urban infrastructure designed to tackle climate change, rapid urbanization, population growth, and equity issues (Echendu & Okafor, 2021). However, there is a need when conceptualizing the development of smart cities within Uganda to place them firmly within an African context. As discussed, for country ownership to truly be realized, there is a need to reject existing standards of best practices conceived by the Western world. Instead, supporting the critical analysis of a framework investigating how urban development can be operationalized more sustainably while remaining firmly planted within the Ugandan context is imperative.

Urban planning, can differ, in terms of strategy versus what is ultimately implemented. This is called ‘runaway development’ and has become common in Kampala (Lwasa, 2017). The outcomes of runaway development can have downstream detrimental impacts in terms of contributions to climate change, requiring more reliance on vehicles powered by fossil fuels, more advanced systems than are currently available, and housing sprawl for proximity to employment and otherwise. Housing sprawl makes essential services like waste and

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energy infrastructure more challenging and expensive. These factors, particularly the synchronicity in planning, can be impacted at the regional and local levels within Kampala city. Kampala city is rapidly growing, so planning future development is essential in reducing spatial fragmentation.

Kampala City presents an opportunity to study the output of emissions for the capital, the sources from which they stem, and the impact this has on the country as a whole and in sub-populations, particularly Kampala City dwellers. The relationship between Kampala's greenhouse gas emissions and its reliance on industry and resources, which are responsible for those emissions, is complex and intersectional and will continue to serve as a blueprint for Uganda's other major cities and rapidly urbanizing communities. Fossil fuels support industrial sectors, transportation, domestic use, and electricity generation (Lwasa, 2017). The infrastructure development course of Kampala City must be altered to include new patterns and goals related to reducing emissions to meet the country's promises and goals to international collaboratives such as the NDC and to protect its citizens. One 2019 study by Bamwesigye and Hlavackova found that in Kampala, structural barriers such as poor urban transportation planning, as well as cultural barriers such as gender norms, limit the ability of the urban population to utilize low-carbon transportation methods, such as cycling within the city. This limits the ability of individuals to take part in personal action to mitigate climate change and discourages the use of climate-smart transport systems.

Additionally, any climate change mitigation strategies implemented in Kampala must also take into account that Kampala contributes heavily to the country's outputs, generating a significant portion of the country's gross domestic product. Given Kampala City's crucial role in Uganda's economic, political, and cultural spheres, prioritizing climate-smart development will have large implications for the future development of urban areas within Uganda. Thus, it presents an ideal opportunity to implement sustainable urban planning principles to promote the development of urban areas with climate-smart concepts in mind.

The Parish Development Model

The Parish Development Model (PDM), kicked off in July of 2021, can also serve as a leverage point in renewing community efforts and engaging these vulnerable communities in implementing environmental protections. The Ugandan Ministry of Local Government conducts the Parish Development under the third Development Plan (NDP III). This model defines itself as follows, "... is premised on the model that the Parish Development Committee(PDC) together with common citizens as the end user of social services are better placed to identify and respond to their own needs, priorities, and direct use of resources (Republic of Uganda 2021)." The essential function of the Model is to raise the voices of the common citizen in Uganda. The Model also aims to "deepen the decentralization process" in the context of socio-economic transformation and increasing accountability at the local level.

Climate change approaches could be infused with the existing Development Model within its seven core pillars (production/storage/processing/marketing, infrastructure economic services, financial inclusion, social services, mindset change, parish-based management information system, and governance and administration). The Development Model follows two key principles-organization and markets market orientation. One of the PDM's goals is to support Uganda's agricultural sector by building of infrastructure that process and markets the products that come out of this sector. This report references the need to intentionally plan for future infrastructure in Uganda utilizing a green approach. Suppose the PDM can partner with the local city authorities and the Ministry of Lands, Housing, and Urban Development to create dual goals around green infrastructure planning and developing Uganda's agricultural sector and products simultaneously. Consequently, this will sustainably benefit the country . In addition to building up Uganda's agricultural infrastructure, the PDM aims to coordinate farms at the parish level to increase the sustainability of their production and give farms access to finance/business training and agricultural extension services.

As Uganda's agricultural sector is one of the most threatened by climate impact and will have the largest impact on livelihood and survival, the support of the farmer level is crucial. If the government

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can financially support farmers in their pending challenges with climate change, this will help to sustain agricultural gains in Uganda. There may ultimately be mass changes in process or relocation for the farmers of Uganda due to climate impact, and these changes will require funding. Another of the PDM's goals is to collect household data that will ultimately inform governmental interventions. A theme that is reiterated throughout this report is the absolute necessity of gathering information from the mouths of Ugandans themselves so that each individual, family, and community has the opportunity to advocate for their unique and specific needs as relates to climate change concerns and the resources they need and will need to survive climate change impacts. The PDM wants to hear from local communities about the the bottlenecks they experience in developing their immediate economies.

Climate change will undoubtedly impact the livelihoods of many in Uganda. The PDM should consider using this exchange of information to very specifically learn about what communities are already experiencing in terms of weather change that is impacting their economy or could have the potential to impact their economy. Hypothetical scenarios can be very helpful in these situations as well as looking for specifics around climate change-related details in the feedback at the community level. "Participatory planning" is the term that PDM uses to describe this process, and this principle in approach should be duplicated across all areas of climate change preparedness and mitigation strategies in Uganda. The PDM has a clearly stated goal around addressing vulnerable populations such as women, youth, and persons with a disability. The intent is to create action plans around inclusion for these groups. This is again an area where climate change warrants its action plan for disadvantaged, marginalized, or previously excluded populations. Within the context of their larger communities in Uganda, vulnerable populations will need individualized action plans as they experience disparities and gaps where the rest of the more advantaged populations do not.

BUILDING COMMUNITY RESILIENCE THROUGH INTEGRATING KNOWLEDGE SYSTEMS

In the wake of the increased frequency and intensity of climate-induced disasters and agricultural stressors, which have the potential to increase disaster-related economic damages globally in the coming years (Coronese et al., 2019), countries worldwide are taking measures to adapt to and safeguard their lands and peoples from the negative effects of climate change. While overall deaths attributable to climate-related disasters have decreased in the last 50 years, mainly because of improved disaster management techniques and early warning systems, likely, the overall amount of extreme weather events and their economic impact are increasing, disproportionately affecting low- and middle-income countries (LMICs) (WMO, 2021).

It is difficult to argue that many of the disasters previously touted as natural are increasingly being caused and worsened by anthropogenic changes to the earth. This is not to say that weather variability, such as temperature changes and tropical storms, is not also a natural byproduct of Earth's incredibly complex geological and atmospheric processes. However, with increasing temperatures, rising sea levels, changing precipitation patterns, deforestation, and more – all of which can be linked to human activities – the world is seeing increases in the intensity and, in some cases, the frequency of extreme weather and climate-induced disasters (AghaKouchak et al., 2020). Human encroachment and development of previously natural land and water space, as well as high levels of carbon emissions, poorly planned infrastructure and policy decisions, and overconsumption of the earth's natural resources, all contribute to and augment the damaging effects of these climatic changes.

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Some of the essential adaptation strategies to these changes have to do with coping with the effects of increasingly severe natural disasters and increasingly prevalent periods of food insecurity. Based on communications from the United Nations Framework Convention on Climate Change, Nhamo and Muchuru (2019) found that some essential adaptation measures that have a precedent for being implemented in Uganda are “weather-based forecasting and early warning systems, public education and awareness, putting in place appropriate policies, surveillance, research and monitoring as well as improving public health infrastructure and technology.” Any good adaptation strategy must also incorporate robust monitoring and evaluation frameworks to ensure that the Ugandan government is held accountable to its constituents; furthermore, the use of indicators of climate change (See Appendix B) is useful when attempting to determine impacts and associated changes of climate-related policies and interventions (Karani et al., 2015).

Many individuals relying on the agricultural sector have already had to adapt in some way, such as by diversifying their livelihoods, turning to raising cattle, entering the fishing industry, or migrating to a new area to accommodate environmental stressors (Afifi et al., 2012). Especially when considering Uganda’s pastoral population, which is highly vulnerable to the effects of climate change on their livelihoods and community structure, it is essential to discuss adaptation strategies that accommodate their lifestyle. Many pastoralists decide which adaptation strategies to adopt based on a combination of indigenous and evidentiary-based forecasts, indicating that the integration of indigenous knowledge with scientific findings is essential to reduce vulnerabilities and allow for informed decision making among this population (Nkuba et al., 2019).

Fishing communities and communities that rely on aquaculture also are vulnerable to floods, water degradation, and fish population fluctuations that emerge as a result of climate change; there is a need for a focus on promoting adaptation strategies and sustainable fishing to ensure the continued well-being of those who rely on fishing for their livelihoods (Oyebola et al., 2021). Rural communities must be empowered and allowed to participate in developing climate mitigation strategies to ensure that their unique needs are addressed. True country

ownership requires this level of participation from all stakeholders across Uganda, including those historically disenfranchised.

Additionally, there is a need to take advantage of indigenous knowledge and local capacity when developing such monitoring and evaluation frameworks. Many pastoralists decide which adaptation strategies to adopt based on a combination of indigenous and evidentiary-based forecasts, indicating that integrating indigenous knowledge with scientific findings is essential to reduce vulnerabilities and allow for informed decision-making among this population (Nkuba et al., 2019).

CASE STUDY 5

Knowledge Integration in Pastoralist Livestock Systems of Uganda as a Response to Climate Change

Pastoralism is one of the human activities in African Savannahs that has long demonstrated resilience to a variable climate (Dietz, 1987; Lind et al., 2016). Africa's arid and semi-arid savannah regions have historically experienced a variable climate where pastoralism has coped with droughts, excessive floods, and famine (Egeru, 2014; Kandagor, 2005). National meteorological services have always provided daily forecasts but more recently on a seasonal basis to enable livelihood decisions dependent on weather conditions, including pastoralism (Luseno et al., 2003; Ngugi et al., 2011). Seasonal forecasts are recent, partly because slow-onset hydro-meteorological hazards evolve. Thus, information on possibilities for the performance and intensity of rains to be received is useful in enabling micro-level planning such as grazing (Ngugi et al., 2011). Seasonal forecasts improve weather services because they provide warning alerts about possible hazards or a good season that would enable timely planning for optimum productivity. Some existing inter-agency coordinating mechanisms exist, especially regarding weather seasonal forecasts that can be built upon. Nevertheless, the mechanisms are also largely constrained by the mainstream Government agency of Uganda National Meteorological Authority (UNMA), which is mandated to issue daily and seasonal forecasts (Hansen et al., 2011). Thus, UNMA controls and owns the weather data and sets principles for sharing and disseminating this data. The synthesis of weather data comes in the form of a seasonal forecast bulletin released by the Minister in charge. However, data needed for adaptation methods to make grazing decisions, determining routes for migration and water

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resource utilization (Egeru, 2012; Nyambura, 2003). The most important data for pastoralists is information regarding water and pasture so they can plan for livestock grazing, where to graze, and by which herding groups. Weather information and particularly seasonal forecasts provide the basis for livestock herding because pastoralists would anticipate where pastures and water would be in abundance. The pastoralists have traditional institutions with a hierarchy that includes herders at the lowest level supervised by Kraal leaders, who in turn are supervised by elders who form an elders' council that determines the routes, grazing patterns, and the decision to migrate. The actors regularly meet to use traditionally predicted weather and decide how the grazing will be managed. In case of an anticipated drought, elders from different groups of the Pokot, Bokora, Dodoth, Jie, Labwor, and Matheniko, which are the tribal groups with slightly differing cultures languages, meet to dialogue about the forecasted drought or rains and how grazing lands can be shared to minimize loss of livestock. In the grazing areas of the Dodoth, a transboundary issue with Turkana from Kenya exists, and thus these are often incorporated into the discussions (Dietz, 1987). The traditional system for predicting seasonal weather is based on four traditionally known weather seasons, which differ from the two conventional UNMA seasons.

The seasons include the dry season (Akamu) (mid-November, December, January, and February), the post-dry season (Akiceret), (Mid-February, March, and April), the pre-wet season (Akiporo) (months of May, June, July, August, and September) and the wet rainy season (Atieth) (September, October, and mid-November). In addition to knowing their grazing fields, pastoralists rely on data from the traditional system for these detailed seasons, which illustrates the need for higher temporal resolution and spatially detailed information as opposed to the UNMA seasonal forecasts. The information regarding forecasts from UNMA does not align with these seasons and is not detailed enough at small spatial scales. But the pastoralists also use the information from the government and other institutions operating in the region. Decisions regarding grazing are tied to these four seasons, which are locally and traditionally understood (Egeru, 2012). Pastoralist decisions occur at the herding level and not necessarily at the household level. Herding is organized in kraals which are located distances away from the household. There is a separation of grazing roles in Karamoja, where households are mostly occupied by women, children, and the elderly while the young able-bodied graze distances from the household locations- herders in the kraals traversing the region in advance search of water and pasture. Herders can stay away from the households for many seasons depending on pasture performance. The Council of Elders is responsible for guiding grazing decisions and all other issues associated with grazing, such as conflict resolution (Barnabas, 2012; Chapman & Kagaha, 2009; Inselman, 2003; Mkutu, 2008). Elders determine grazing plan, which

among other strategies, includes the location of grazing fields for a block period of two weeks and the transects along which animals should be grazed or migrate (Otim, 2004). The Kraal leaders collect data on the availability of water and pastures, which they pass on to the elders. This traditional system involves traversing large tracts of land in search of resources that involve cross-border treks. In conjunction with the kraal leaders, the elders' work is to synthesize data and information collected traditionally and integrate it with forecasts from the UNMA and IGAD agencies. Traditional systems involve shrines where traditional forecasts are made, and information is disseminated through open community meetings (Egeru, 2012; Ejoku-Oonyu, 2009). The shrine leaders use various artifacts to foretell the weather. The leaders then communicate what the diviners tell about the performance of rains, water, and pastures providing advice to elders. The elders meet with kraal leaders and order give orders on where and when the animals can graze.

Given that indigenous knowledge is often the main source of information for weather forecasting (Kyazze et al., 2012), integrating these types of knowledge into climate mitigation methods could increase community resilience and promote the ability of individuals in rural areas to maximize crop yields even in a shifting environment (Okonya & Kroschel, 2013). Utilizing informed individuals on the ground who are extremely aware of their environment and have lived experience monitoring environmental changes over long periods, in conjunction with rigorous scientific methods, will be valuable in assessing the impact of different strategies and any adjustments needed when implementing them. Validating indigenous knowledge allows farmers to participate as agents of change with the capacity to act in their response to climate change (Orlove et al., 2010). This also has the potential to empower communities and promote individual agency, which, as discussed, is essential for increasing individual action. Furthermore, given the significant impact of accurate climate forecasting on individuals' ability to predict and plan in response to climatic changes, investment in this sector must also be a priority.

This is especially pressing given the lack of government investment in revitalizing the agricultural sector or support for smallholder farmers in Uganda and other East African countries (Nyasimi et al., 2013). One 2013 study revealed that farmers are acutely aware of the changing

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climate and are adjusting to these changes, although these coping efforts were influenced by the gender of the head of the household (Okonya et al., 2013). Another 2021 study found that, in a sample of 395 heads of households among smallholder farmers, farmers are already adapting to environmental changes and utilizing their knowledge base to make this decision (Atube et al., 2021). This implies that targeted interventions, including improving climate information systems, increasing government-sponsored support, and hosting training and information sessions, could all be useful in improving farmer resilience and adaptation to climate change. Additionally, there is a need to investigate climatic impacts on all actors along the agricultural value chain, critically analyzing upstream and downstream factors to develop informed risk mitigation strategies (Dekens & Bagamba, 2014).

Given this evidence, the Committee makes the following recommendations:

1. Through the Ministry of Agriculture, Animal Industry, and Fisheries, the Government of Uganda should invest in value addition technologies for product development to promote community action.
2. Integrating indigenous knowledge and scientific knowledge to inform options for adaptation in different ecological zones of the country is crucial for ownership.
3. Migration can be a pre-emptive adaptation strategy. However, for voluntary immobile populations, participatory planning is important for ownership.

ATTITUDES AND KNOWLEDGE FOR COLLECTIVE CLIMATE ADAPTION

The use of incentives and national-level climate finance mechanisms and policies, as discussed, are crucial mechanisms to ensure the adoption of cleaner, more conscientious behaviors. This behavior change requires a reshaping of the climate change dialogue. Clear communication of the causes and effects of climate change is essential to promote the human connection to and perceptions of climate change, thus allowing for the development of strategies adopted at the individual level. This will require high levels of social capital to promote personal responsibility and adoption of mitigation and adaptation strategies and will necessitate local knowledge sharing and communication to promote collective action and drive change (Carmen et al., 2022).

Adopting cleaner cookstoves and alternative energy sources is one example where individuals may need to be persuaded to transition to such structures, which will require local knowledge sharing and clear communication of risks and benefits. Developing cleaner cookstoves has long been seen as essential to promoting the health of women and children who often come in close contact with indoor air pollution due to these stoves (Kisiki Nsamba et al., 2021). Not only are these stoves harmful to human health, but they are also inefficient. Thus, there is a need to promote cleaner burning fuels and cooking technologies. Promoting the use of biomass briquettes is a potential option for developing environmentally friendly fuel sources in Uganda, as it not only burns cleaner and is more affordable but also has the potential to promote the development of local jobs, reduce deforestation, and improve waste treatment systems (Mahoro et al., 2022).

Social processes and sociocultural factors play a large role in the decision-making processes underlying the voluntary or incentivized adoption of different climate change mitigation efforts (Yameogo et al., 2018). For example, farmers in West Africa were heavily influenced

CASE STUDY 6

Leveraging Co-benefits of Climate Mitigation and Adaptation Technologies: The Case of Clean Cook-stoves and Respiratory Health

Although women and children in Uganda are disproportionately exposed to indoor air pollution caused by burning biomass in cookstoves, many individuals do not know about the negative health effects that can be caused by this pollution. The Midwife Project recruited mothers, midwives and community health workers to take part in an education campaign to increase awareness on the health risks of these types of cookstoves (Cartwright et al., 2022).

One individual commented: *Now what she has learnt, or ever since she had knowledge about the smoke from the midwives, she now has improved on her cooking place, she has now learnt she should not sit with her children in the kitchen while cooking, as well as she should also not sit in there while cooking ... that she has to get out, get fresh air and only check on what she's cooking ... (Mother 1, Mpambwa)*

Although a qualitative follow-up study indicated that the individuals continued to engage with the program even after the project ended, there were mixed results in the uptake of behavioral changes, primarily due to financial barriers. This emphasizes the importance of developing feasible and accessible cookstove strategies in communities to improve not only air quality but also community health.

by the social dynamics and cooperation among the community when adopting climate change adaptation strategies (Yameogo et al., 2018). Recognizing the importance of this will aid researchers in developing strategies that promote the uptake of positive climate-change actions.

Emphasizing social capital and collective resilience is especially important for many vulnerable communities with limited resources to adapt to environmental and economic changes easily. Pre-existing inequalities may be aggravated by climate change and reinforced by social and economic shocks resulting from the current pandemic, emphasizing the urgency of developing mitigation strategies targeting vulnerable populations. Ugandan policies have articulated the need for prioritizing community capacity, gender mainstreaming, and participation of

vulnerable groups, especially women and children, when developing climate adaptation and mitigation strategies (Nyasimi et al., 2018). Thus, focusing on culturally appropriate and targeted adaptation strategies is essential to provide communities with the tools and resources needed to survive in a changing climate. This includes developing protections for rising sea levels, increased severity of natural disasters, food insecurity and crop failures, heat stress, and more. Both mitigation and adaptation are essential to combat the climate crisis. However, adaptation is an essential strategy to prioritize more immediate results in areas that may not receive structural benefits from large-scale mitigation strategies or have the sociopolitical force to enact such strategies.

APPENDIX A

CLIMATE CHANGE AND HISTORICAL INEQUALITIES

Anthropogenic climate change only serves to exacerbate and emphasize the global disparities that are embedded in our societies. The countries that contributed the least to climate change, such as those in Sub-Saharan Africa, are also the countries that will face the most immediate effects and have the fewest resources to combat them. Meanwhile, high-income countries that have historically benefited from widespread and unchecked fossil fuel extraction and consumption, enabling large-scale industrialization and economic growth for centuries, are not only among those least likely to reduce their consumption but also possess more resources to develop mitigation and adaptation mechanisms.

East Africa is a region that is especially vulnerable to climate change due to geographic and social factors; these factors are exacerbated by rapidly-increasing populations, limited institutional capacity, political instability, and the limited climate resilience and adaptation strategies currently in place (Ide et al., 2014). The sub-Saharan African region may experience many climate-related challenges in the near future due to a range of geographic and social factors which leaves them vulnerable to the effects of climate change; these factors can be exacerbated by violent social conflicts, high population density, and a rapidly-increasing population, political instability, a limited health infrastructure, low institutional capacity, and limited resilience and adaptation strategies (Ide et al., 2014; World Bank, 2013). This social and political instability is rooted in colonial legacies and income inequality. Nevertheless, climate change can exacerbate these inequalities and challenge nations' peacebuilding and development efforts.

APPENDIX B

CLIMATE CHANGE INDICATORS

Indicators of climate change impact, which include sea level, ocean acidification, surface temperature fluctuations, the relative percentage of atmospheric carbon dioxide, and the relative percentages of glaciers and arctic/antarctic sea ice, all suggest that anthropogenic activities since the mid-1800s have drastically altered the earth's climate (NASA, n.d.) (see Fig. 16).

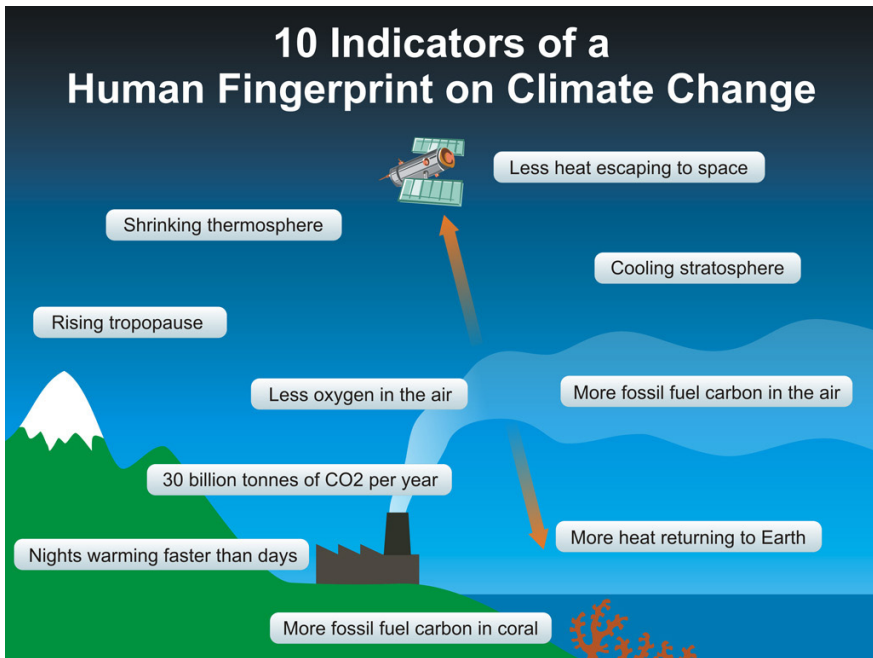


FIGURE 16 Indicators of Anthropogenic Influence on Climate Change
SOURCE: Reddy, 2014.

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Monitoring changes to these indicators allows predictions regarding the current trajectory and rate of climate change, which is an essential component of any response effort. However, although current climate models and indicators have been essential in informing these predictions, local knowledge and contributions are increasingly being recognized as essential to integrate into current systems to better understand climate phenomena at the local level (Reyes-Garcia et al., 2016).

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